GUNSTOCK WOODS
AND OTHER FINE TIMBERS

VIRGIL M. DAVIS

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BY

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FOREWORD

This book has been written to fill a knowledge gap the author discovered when he attempted to find the history and origin of the names commonly applied to the walnut woods used by the custom gunsmiths in crafting the most prized long-guns for the shooting trade. Inspiration came from encouragement of contacts when the author tried in vain to find information about some stock blanks he had obtained in a trade at a gun show. Not only was the information skimpy, there were many published 'half-truths' and inconsistencies. It has been the author's intent to present material in this book that will enlighten the interested, clear up some of the misconceptions, and prove useful to the seasoned professional as well as the neophyte in gun lore.

With a goal in mind to fill this void of information, the author has gathered significant data from a wide variety of sources, not only on the common gunstock woods, but also on a multitude of other woods used in the trade as well. Presentation of the technical material on these woods alone was not considered useful without showing some uses and applications; therefore the author has included in this document other related subjects to complete the life-cycle of a blank from-the-cradle-to-the-grave of the wood usage.

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INTRODUCTION

As implied by the title, this book is basically about gunstock woods and their uses by the professionals in custom gun crafting. A prior investigation of correct names for various woods used primarily by the stockmaker led to the publication of this book. It has been written in an attempt to answer the questions most asked by the layman, novice stockmaker, cutter, wood buyer, or custom gunsmith, whether they are an interested sideline observer or a seasoned professional. With students of the woodcraft art in mind, either those having a formal or passing interest, and primarily students of the many formal gunsmith schools, as well as those practicing the professions of custom stockmakers and gunsmiths, the author has written this book in quasi-technical terms. A book understandable by the layman, to serve as a text, refresher, and reference guide, and to help promote the use of fine woods for fine guns and to advance the arts and crafts of the custom gunsmith trade.

This book will be useful, especially the two chapters on different woods and decorator materials, for anyone interested in woodwork of almost any type, the furniture builder, decorator, wood carver, custom stockmaker, and knifemaker. The author describes over two hundred woods, mostly hardwoods (domestic and imported), for which application may be considered. Twelve of these woods are shown in full color as stock blanks; then they are shown after the stock is finished and installed on the gun. It is not necessarily a how-to book but an information document to assist in selection of woods, grain patterns, and trim.

No text on gunstock woods could be considered complete without discussions of all known suitable woods and decorator materials, their origin, botanical name, distinct and unique characteristics, and precautions in their use and application. Precautions, especially for those woods that produce toxic dust or fumes when cut or sanded, are given.

With some rare exceptions, the terminology and terms used herein are those in general or accepted use in the world-wide guncraft trade of today. Generally, the 'shop-talk' type of nomenclature has been utilized since it gives a common language of communication.

Although some liberties have been taken in organizing and presenting the data, the author has attempted to relate data from the latest dated publication. When conflicts occurred that were impossible to reconcile, the newest published source was accepted for printed information; but verbal information from the oldest and wisest first-

hand witness carried the greatest weight in determinations not yet in print. The use of printed information was especially useful in conflicts of botanical names and genera while the latter, verbal non-print data, was applied more to subjective items where experience and everyday contact becomes meaningful. In some conclusions the consensus of the collective experts (majority vote) was the determining factor.

Although the author has tried to avoid lengthy discussions, some aspects may be too detailed while others will seem too brief. In all cases the most significant points have been stressed that have been prominent in the minds of the seasoned professionals, whether they are cutters, carvers, or custom stockmakers. References are provided for sources of detailed information not considered proper for this text.

As pointed out earlier, this is not a 'step-by-step' procedure or a complete 'how-to' book, but it highlights all the important steps to be taken in making a gunstock. The author leads the reader through the orderly process of selecting the proper wood — choosing a blank of that wood — to having the final finished piece of the selected wood mated to the metal of the gun.

There are three ways to read this book: (1) Look at the pretty wood pictures; (2) read only those areas of interest to you; (3) read it from cover to cover and save for a ready reference. In all three methods everyone from the neophyte to the seasoned, elder professional will find much valuable information between the covers.

CHAPTER I

GENERAL INFORMATION

TYPES OF TREES AND WOODS — Trees are subdivided botanically into two major groups, hardwoods and softwoods. A second division, akin to the first, is by leaf configuration, from that we obtain the classes of broad-leaf (hardwood) and needle-shaped (softwood). Additionally, these same trees are also called deciduous (hardwood) or evergreen (softwood) in a classification which relates to the way the tree sheds its leaves, where a deciduous tree is one that drops its leaves all at one time sometime during the year, usually fall, while the evergreen continuously puts on new foliage throughout the year. So we therefore find this kind of relationship with the three classifications of trees, none unique or all encompassing.

Hardwoods — Broad-leafed — Deciduous
Softwoods — Needle-shaped — Evergreen

As usual, Mother Nature makes exceptions to the rule, and we find some hardwoods softer than a softwood and vice versa. An example is redwood, a needle-bearing softwood, which has a hardness of 480 lbs. while aspen, a broad-leaf hardwood, has a hardness of only 350 lbs. One common tree, the magnolia, normally considered a hardwood, is an evergreen having broad leaves. Bald cypress, a coniferous softwood with needle-like leaves, is deciduous, shedding its leaves each fall and having a hardness of 510 lbs. exceeding several broad-leafed hardwoods in measured hardness. It is then apparent that these classifications hold for most woods but are not true in every case.

Hardwoods are of the greatest interest to the stockmaker and furniture builder. Even though many softwoods find wide use in some furniture and interior furniture parts, there is little application in gunwork. With the continued inadequate supply of good walnut, more attention will be focused on some of the softwoods with higher hardness and shock ratings for use on guns having light recoil and little need for cut checkering.

CUTTING — The process of tree cutting as described here includes all those operations performed from the start of tree removal until the cut-up sections are delivered to the sawmill. First, no live and growing

tree under 24″ in diameter should be harvested for gunstock wood. If removal of a smaller tree is mandatory, you should plan on using the tree for lumber and what gunstock wood you get will be a bonus. Besides the common equipment needed for tree removal, the knowledge of what species of tree to be cut is very important. If the correct common name is not readily known, you should reseach the information needed to ascertain the correct name before you embark on the cutting task. Leaves and fruit/nuts give the most useful information when the tree is alive and bearing. Recognition information is provided for many of the walnuts in Chapter IV to assist the novice cutter and to avoid costly and embarrassing mistakes.

Cutting is not really a proper nomenclature for most gunstock wood trees — they are, and rightly so, dug-out — to save the fine figure and color found at the junction of the roots and stump (or buttress as the botanists call it). Some cutters prefer to cut the trunk about 36″ above the ground and after the main body of the tree is worked up then remove the stump. Dirt should be removed from around each root until the root-trunk union is clearly defined; the roots, including the tap root, can then all be cut away and allow the stump removal.

Once a tree is 'felled,' cutting it into sections of proper dimensions is most important. More good wood is ruined and wasted in this process than any other operation on the gunstock. After the main body is severed from the stump, the body can be cut into sections as shown in Figure 1.

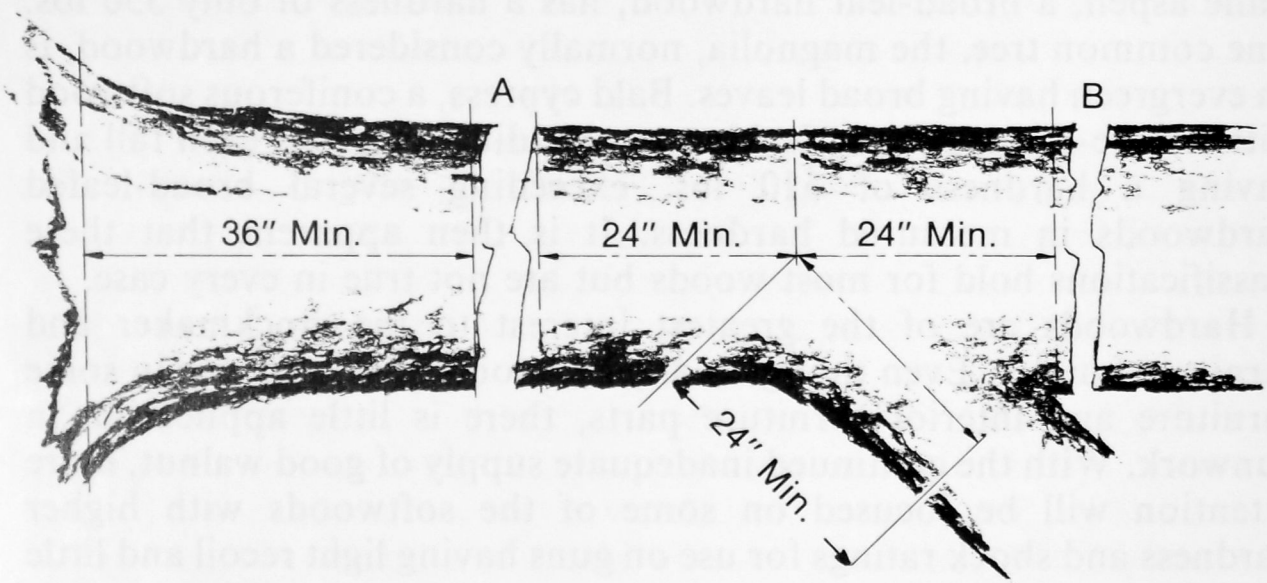


Figure 1. Method of Sectioning a Tree

The section around the crotch (place where 'Y' shaped forks are formed at the juncture of a main branch) needs special consideration

since this area often produces some of the best blanks. In the sketch the overall section of the crotch is shown to be 48″; this is to provide some flexibility in locating the gunstock blank in the best position to obtain the best figure and grain structure. If mannlicher or Kentucky rifle blanks are desired, the cuts shown as 24 and 36 should be increased by 8″ for the mannlicher and 18″ for the Kentucky rifle. If it is impossible to get the full 24 or 36 on either of the cuts shown, two-piece shotgun blank sections can be cut to 1/2 those dimensions shown. Sections A and B are to be cut to the longest length possible for convenient handling or desired lumber board length. It is often worthwhile to slab or core bore one of the straight sections like A and B to see if it has any fancy figure or special grain structure like fiddleback, wavy grain, or swirls. Many trees, especially on a side opposite the prevailing winds, develop beautiful figure even in a straight section of the main trunk.

After the sections are separated, sell the straight sections of A and B for lumber; sell the sections too small in diameter for lumber for firewood; make sure graft scions have been gathered and identified to the tree being cut; clean up and burn or dump the small twigs, branches and leaves. Clearly identify, with a fixed semi-rigid tag on each section, as to type of tree, tree sequence or number for the logbook, date cut, and locale (state, city, street or county) where cut. Once a log is 'sawed-out' wood identification can become difficult to impossible. Now the sections to be used for gunstock blanks can be moved to the sawmill and stacked to await sawing.

SAWING — Sawing is quite often a one-man operation. In fact many stockwood dealers do the cutting, sawing, drying, and vending of the seasoned blanks. The mill operator may have help in the form of manual labor, but he alone is the one with all the expertise and wood savvy. Operation of a stock mill is usually a periodic or spasmodic affair, wherein sawing is done in a slack period, which, unfortunately, is normally in the dead-of-winter. There is really no hurry since the time from cutting to installation of the stock on a gun is somewhere around three years at best. Specialized drying methods shorten this time for some woods, but air-drying is considered best by the old timers, especially for the walnuts. When sawing gets underway, the logs are 'sawed-out' in either slab or quarter sawed form or one of the modified forms of sawing. These 2¾ to 3″ thick pieces are then dried further in stacks with stick separators, to allow the air to circulate evenly around each board, in a shed or covered structure to prevent exposure to rain or direct sunlight. As the logs are cut, identification, at least by tree number, must be carried forward to each board of the stack.

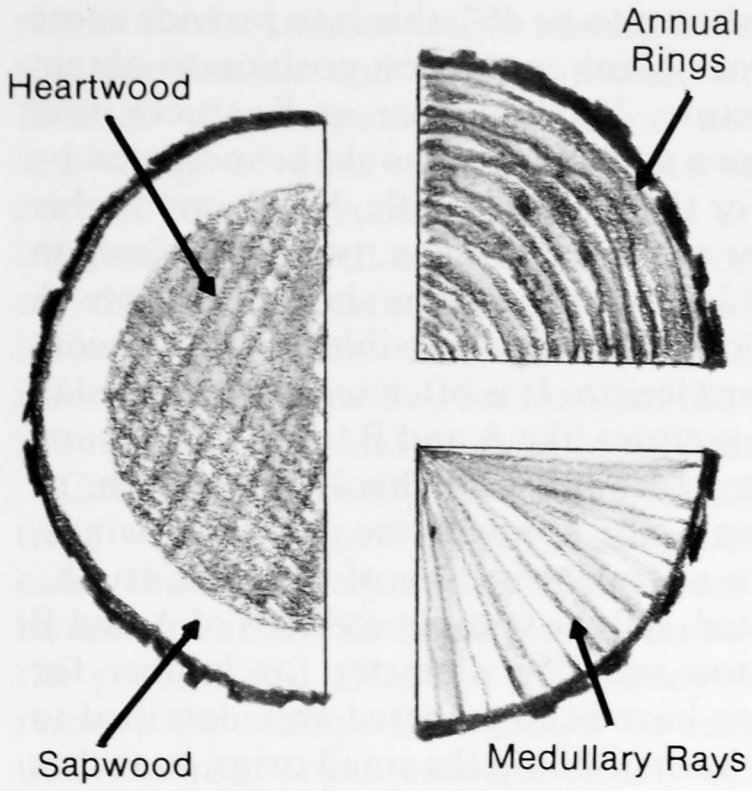
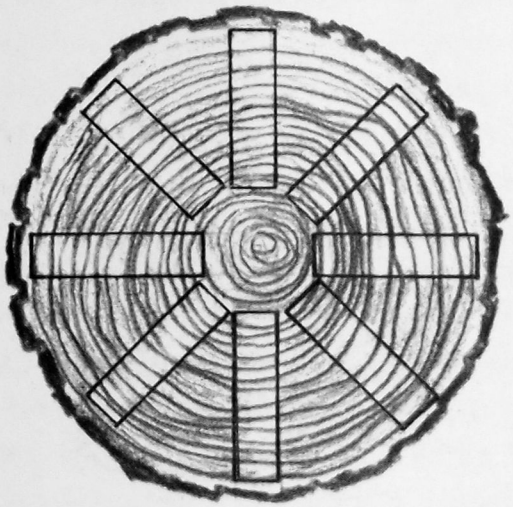
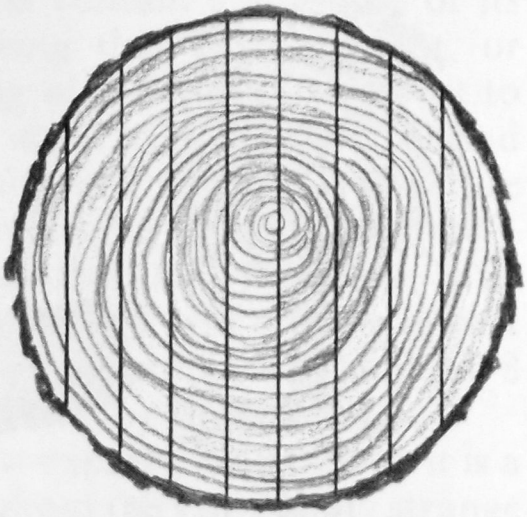


Figure 2.
Cross Section of a Tree

Sawing methods strongly influence the resulting figure and grain flow and in some cases affect the acceptance of the wood for use as a gunstock. At this point the expertise of the person doing the sawing will assure that the results are 'blanks' — not planks. Figure 2 shows the cross section of a tree depicting the significant characteristics important to the stockmaker. The left half of the sketch shows the sapwood and heartwood while the split upper half and lower half emphasizes the annual growth rings and the medullary rings or rays respectively. Wood that is cut parallel to the rays is quarter sawed, while that cut perpendicular to the rays is flat or slab sawed. On quarter sawed lumber, the growth rings or layers appear on the surface of the wood as parallel stripes running lengthwise; while a slab sawed board has a parabolic pattern on the exposed surface. Slab sawing wastes the least wood and allows salvage of the unwanted slabs for furniture or lumber use. Quarter sawing produces the most desirable blanks but it will probably cause some undesirable waste. Displays in figure 3 show the most common methods of sawing, including splitting and modified slab. View 3-a is the normal quarter cut; 3-b is the slab; 3-c the modified form of quarter cut known as splitting; and 3-d is the modified form of slab sawing. All the methods have their respective advantages and disadvantages and should be applied accordingly. Slab sawing yields at least four blanks equivalent to the quarter sawed log if the tree was at least 24″ when cut. When a huge tree is harvested, any of the sawing methods will result in a large number of usable slabs to be made into rifle and two-piece shotgun blanks.

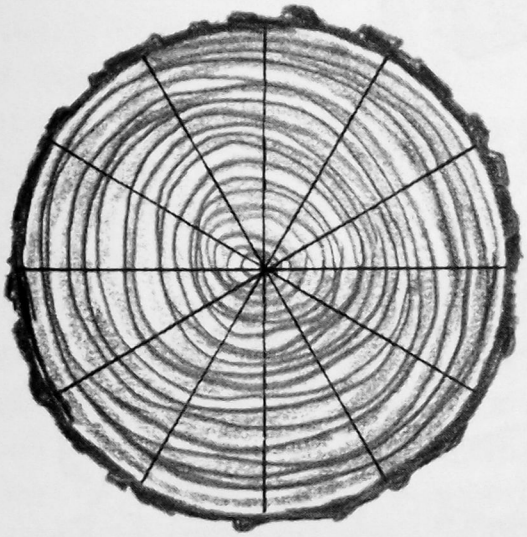


a—Quarter Sawing



b—Slab Sawing

c—Splitting



d—Modified Slab

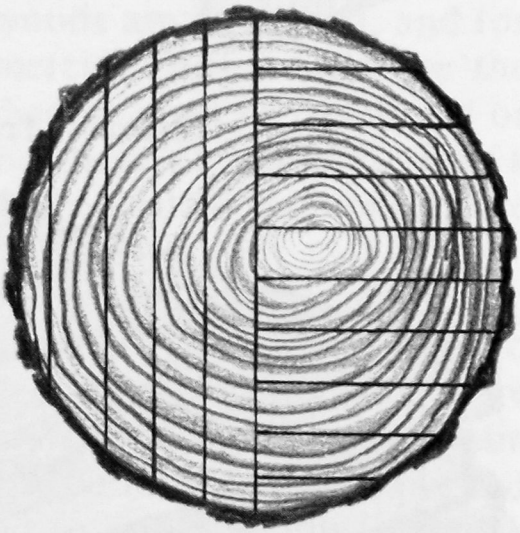


Figure 3. Sawing Methods

Once the logs are sawed into 2¾ to 3″ thick chunks and the scrap sorted out, these are then cut to blank shape and size, and the ends are sealed with candle wax or paraffin to prevent checking. Figure 4 shows these actions from tree to blank.

Tree identification number is carried forward to each blank and the blanks are stacked to allow further air-drying as shown in figure 5.

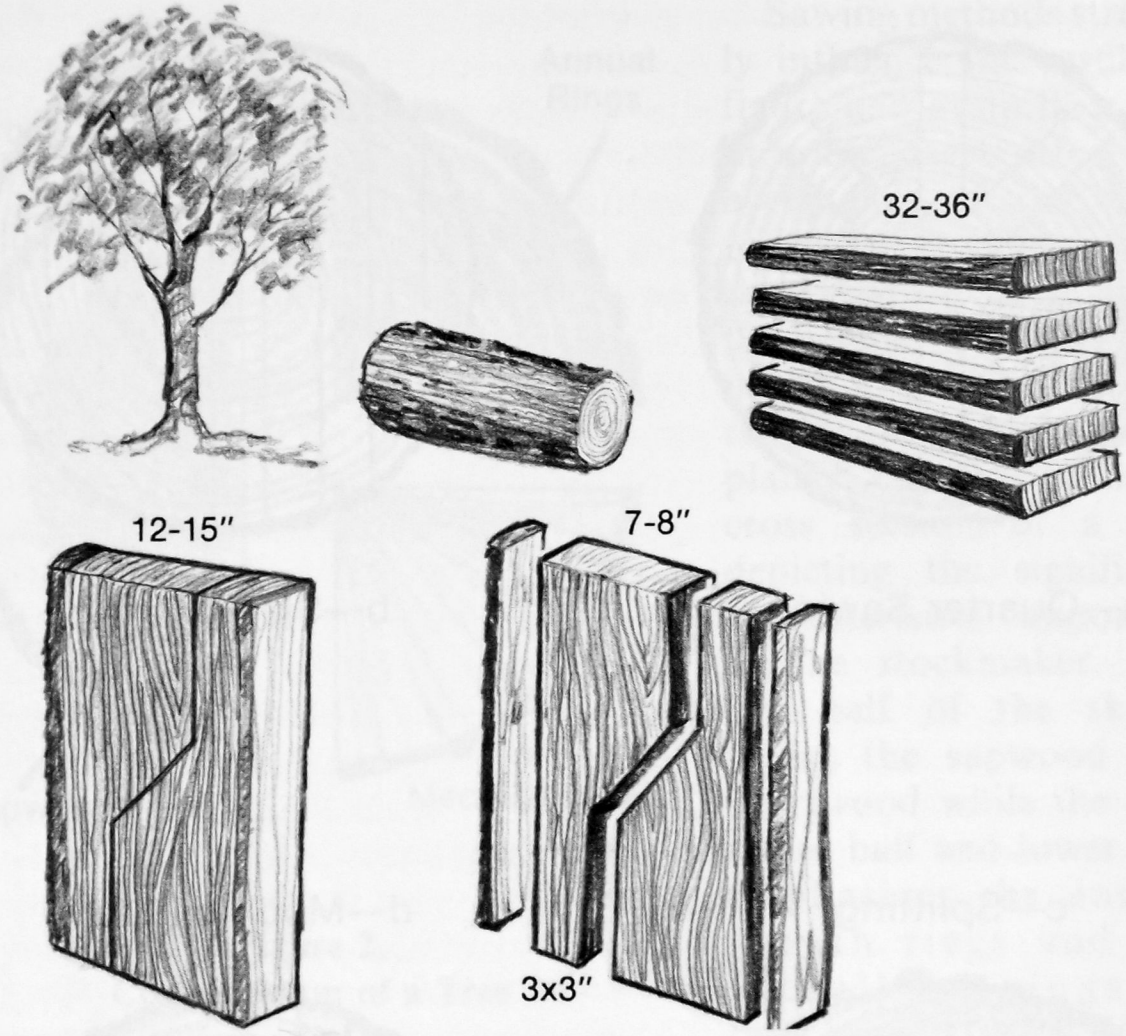


Figure 4. Tree to Blank Sequence

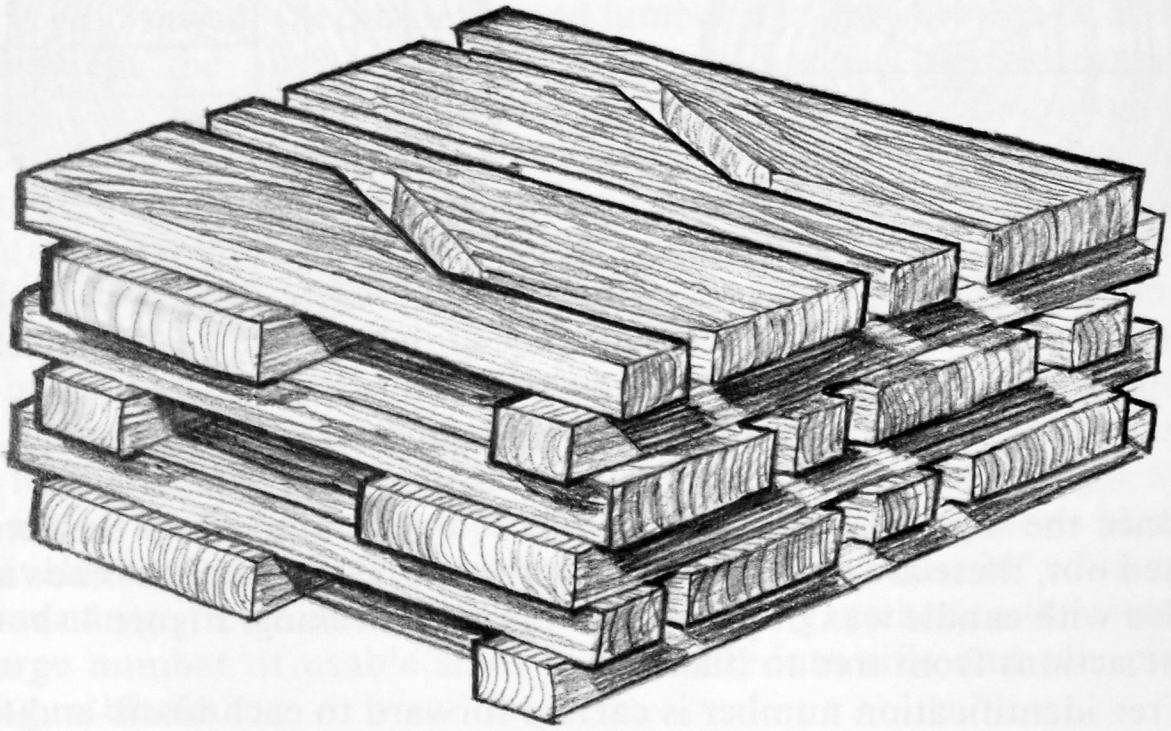


Figure 5. Criss-Cross Stacking to Dry

DRYING — Fresh cut green wood will contain about 40% of its weight as water. The process of removing this water content, or moisture, is known as seasoning or drying of the wood to allow it to stabilize, prevent warpage, and bring the wood to its final weight and hardness. For the wood to be useful as gunstock wood, this moisture content must be reduced to something below 12%, with about 10% being the preferred value. Moisture values less than 10% serve little purpose in most areas of the U.S., since the wood will breathe in new water vapor from the air to stabilize at some moisture value at about 8 to 10% after a period of time as demonstrated by figure 6.

Air-drying is considered the best by most experts, even though it is a slow and time consuming process. Throughout the years many strange and odd schemes have been used to accelerate the drying process, including a salt cure used by one unscrupulous walnut vendor that resulted in the so-called 'salt stocks' on the Browning guns in the late 1970's that caused considerable controversy. Through many efforts and experiments, we have learned that different kinds of wood dry in different ways and at different rates. Some species of wood lose their moisture content rapidly and with little or no distortion, warping, checking, cracking, or collapse; some woods dry readily with plenty of distortion. Other species are very stubborn and hold on to every last drop of moisture. Many American hardwoods are kiln dried, and for the reasons mentioned above, the commercial kilns cannot use the same drying schedule for all woods. A schedule must be developed or adjusted to suit the species and the thickness of material. For a complete set of kiln schedules for American hardwoods, consult the USDA Wood Products HB#101.

Most gunstock woods, with a few rare exceptions, (myrtle, madrone, and small cuts of black walnut) are air-dried, partly before it is cut into blank shape and size, with the process continued after the blanks are stacked. Green, unseasoned, blanks are commonly available at bargain prices (about 50% of the same grade dry). All it takes is some time and patience to convert this unseasoned wood to a dry, usable gunstock blank.

One method of air-drying, with a slight risk, is to store the blank or blanks in some out-of-the-way place like a barn or dry basement where it is protected from the rain and sun, not too hot and not too dry, and forget about it. After 3 or 4 years, you will find a dry piece of wood, ready to make into a gunstock.

A better and safer method to dry wood for the small custom guncrafter or novice is in the closet in your home. Wrap the blank in a loose fitting heavy-duty plastic bag. Cut a ¾" hole in the top and

bottom of the bag and hang it in your closet using 2 screw eyes positioned diagonally opposite in the small end. Hang the bagged blank in the back of the warmest, constant temperature closet of the house. The ideal temperature is 90° to 100° F. In 12 to 18 months, a dry blank should be ready for use. If hanging room is scarce, try standing it in a corner, but do not forget to rotate it, end-for-end and front-to-back every month or so to give it uniform toasting. It is wise to check it now and then to make sure it is not warping or curling. If it tries to curl or twist, clamp it with large 2x4 braces for a few months to make it dry straight. Ends of these blanks should be sealed and the highly figured areas coated with varnish or paint to prevent serious checking.

Moisture content of wood in practice is determined by use of a moisture meter. Two types of meters are in common usage, the dielectric type, which uses the conductivity of radio frequency energy to determine moisture content, and a D.C. resistance type that measures the resistance between two electrodes and displays the result in percentage of moisture. Both give acceptable results; the dielectric is easier to use but it is generally less accurate while the resistance type can cause damage to the wood. The dielectric unit needs only to make physical contact with the piece of wood while the resistance type has a pair of electrodes (spaced about ¾" apart) that need to be inserted ¼ to ½" into the wood sample. The dielectric unit is more for high production usage while the price and use of the resistance type makes it more popular with the blank vendor or stockmaker.

Since the moisture, in the form of sap, increases the weight of the gunstock blank (about 7 lbs. on the average for an 18 lb. green blank) you can determine the moisture content by use of blank weight. If you have procured a green blank, obtain an accurate weight at the on-set and then check the weight every few months until the blank weight has dropped to 60% of its green weight. Check its weight each month thereafter until the weight each month levels off; i.e., the weight remains constant or near constant for 2 or 3 months, the blank is then as dry as it will get under these conditions.

If you do not know the state of dryness of a blank, weigh it accurately for several months and note that its weight decreases with time. When this weight stabilizes, or begins to fluctuate around a mean value, the blank is dry. If you have a blank that has been in storage under uncertain conditions for some time, this same experiment can be performed to ascertain the state of dryness.

There is another method for checking water content by using a sample of the wood if a set of accurate scales is available. A set of good

powder or precious metal scales will suffice. Cut off two or three pieces of the blank in a place that will not interfere with the stock layout. Clean these samples to be free of dirt, wax or varnish, and weigh these very carefully; record the weight to the most accurate reading possible. Bake these pieces in the kitchen oven at 210-220° F for about 2 hours. Remove and weigh; rebake for ½ hour; weigh and continue until baking causes no significant change in weight and the wood is bone dry; weigh carefully and record. Calculate the percent of moisture with the following formula:

$$\frac{\text{wet wt. - dry wt.}}{\text{dry wt.}} \times 100 = \%\ \text{of moisture.}$$

A chemist friend suggests a quick way to test for salt cured wood is to scrape a small amount of sawdust and shavings from the outer surface of several spots on the blank and soak them in distilled water in a clean clear dish. Add a few drops of silver nitrate and examine the water for the presence of a white precipitate. If one is present, return the blank to the vendor for a refund because it probably has been treated with some chemical that will cause uncontrolled corrosion of any metal coming in contact with the wood in the presence of even a mild amount of moisture.

STORAGE OF DRY WOOD — For any of the following storage techniques, both ends must be sealed. If possible, have paint or varnish on any crotch or stump figure to prevent checking or cracking. Ideally, storage of dry blanks would be a criss-cross stack as shown in figure 5, in a building or room with a controlled environment; i.e., a constant temperature of 72° F and a relative humidity of 60% or slightly less. Under these conditions the blanks will remain at 9 to 11% moisture content and will not deteriorate, check, or pick up added moisture.

Wood reabsorbs moisture at a different rate than it dries. Technically stated, this means the drying process has made the wood less hydroscopic. The curve in figure 6 shows what can be expected when a dry blank is stored in a moist area. If the blank was at 6% moisture content when stored in a 72° F room with a relative humidity of 60%, it would reach a new equilibrium moisture content (EMC) of about 10% in due time. Figure 6 is a curve typical of the hardwoods and should be used for judgmental purposes only. Slight variations can be expected for the various species of wood due to different fiber saturation points of the wood, but most gunstock woods will fall inside

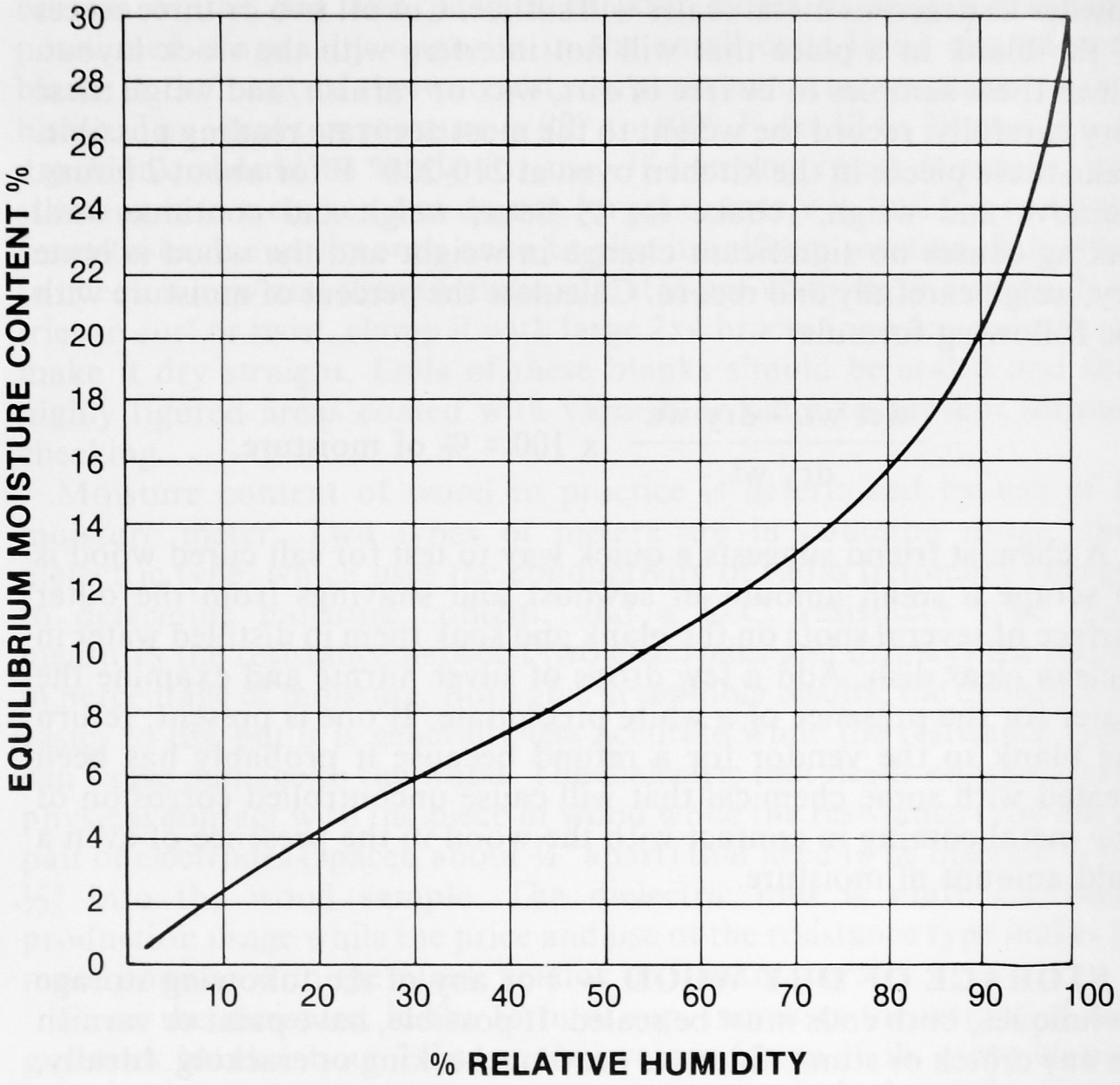


Figure 6. EMC of a Dry Blank for Various Values of RH

the 10% uncertainty of the curve. Three values, at 72° F, to remember are as follows:

25% RH yields about 5% EMC
50% RH yields about 9% EMC
75% RH yields about 14% EMC.

However, to be sure measure the value with a moisture meter.

It is understandable that these ideal conditions are not available to many of the custom stockmakers and novice alike, so a next best storage system must be devised. A second story of a barn or closed shed, protected from rain and direct sunlight, will suffice if care is exercised in placement and position of the dry blanks. Place the blanks in

a semi-vertical position in racks that allow ample separation and ventilation of air around the blank racks. Rotate blanks (end-for-end) frequently (once each 60-90 days) and examine for indications of checks or deterioration. Criss-cross stacking on a covered porch or breezeway is also satisfactory for short periods of time, but you run the risk of some damage if storage is over too long a period of time.

Some wood vendors and stock manufacturers prefer to profile the blanks at this point in the process to a semi-final gunstock shape. By leaving plenty of wood to allow the making of any style or design of stock, these are then sealed and stored for later use. This has the advantage of allowing the blank to relax the internal stresses and avoid a warpage when the final shaping and inletting is done to fulfill the requirement of the custom gun. It also allows a closer examination of the figure and grain structure to better understand what final form can be expected in figure and color.

CHAPTER II

GRAIN—FIGURE—TEXTURE AND COLOR

Many separate, independent, and inter-related factors cause or affect the growth, growth rate, figure, grain structure, color, and rate of development of the various grades of wood used in making gunstocks. Almost any outside influence of the environment causes a change in growth and consequently the resulting figure and grain structure. It is believed, with considerable logic and evidence, that in order to produce ideal gunstock wood, a tree must grow under a precise combination of circumstances, most of them adverse. It should grow in poor soil and receive scant moisture so that it has a slow growth rate to develop hardness. To develop a striking fiddleback figure, the tree needs a constant prevailing wind from one direction. Trees grown in a prevailing wind do exhibit more fiddleback figure than others with uniform direction or no wind. It is quite common in these trees to find that the side opposite the wind produces the most fiddleback. The conjecture is that the side opposite the wind is under constant compressive stress resulting in distortion of the fibers to form the fiddleback figure. Other adverse conditions that seem to develop fancy figure are abuse, injury, and certain types of disease.

Figure, and the grain coloration needed to enhance it, have some relationship to the plant's nervous system, especially disorders or disturbances of the system balance. Recent studies lead some experts to believe most all differences in figure and grain pattern of two similar trees are related to reaction of the plant's nervous system to outside forces. Most wood experts agree that minerals in the tree's food source has a great effect on the color and figure but this is not necessarily wholly true, even though certain minerals must be present or available in the soil for a good color and figure to develop. Case after case has demonstrated that minerals are not the only basic ingredients required to develop a beautiful figure. Trees have been cut in the same area, just 50 to 100 yards apart where one will produce a large quantity of high-grade figured blanks, while the other, which has grown in the same soil and under almost exactly the same conditions, will provide only bland low-grade blanks. Each tree had everything in common except the individual tree's nervous system and plant's disorders.

Diseased trees often have exceptional color and figure in the area of the blemish or injury. Some of the best high-grade blanks I have

examined have come from trees with scars and abnormal growths caused by a variety of disturbances and disorders. In years gone by the French often wrapped young walnut trees with a chain and rewrapped the chain each time the growth advanced beyond a pre-determined stage. Blanks from the trees commanded a fancy price since they produced SOME FANCY figure.

These generalities only lead us to a need of more detail of what figure, grain, and color are and what their contributions are to the beauty and utility of the wood. Each plays its part and contributes, separately or interactively, to the different figure and grain structure.

The terms **grain, figure,** and **texture** are frequently misunderstood and misused. An inaccurate application of these terms can distract from their value in describing the characteristics of a wood. Such misuse often involves a misunderstanding of the technical terms involved or the method and direction of sawing of the wood.

GRAIN — Grain, used in the restricted technical sense, is the direction of orientation of the cells or capillaries of the wood, in particular the flow of the fibrous elements. The type of grain structure and flow are the characteristics that give a wood strength and stability. There are six general types of grain:

1. straight
2. irregular
3. diagonal
4. spiral
5. interlocked
6. wavy.

The first two are self explanatory, but the last four need some explanation.

Diagonal grain is most commonly the result of the method of sawing, wherein the saw cut of the log has not been parallel to the core of the heartwood on the natural growth. Such sawing results in a skewed cut across the grain of the wood.

Spiral grain results from the natural growth of the tree or a distortion caused by an abnormal environment causing the fibers to follow a helical or spiral course in the tree.

Interlocked grain results from the fibers, in successive growth layers, being inclined or twisted in opposite directions resulting in an interlaced or cross-grown structure. This is a common characteristic of the black gum and American elm as well as many of the tropical woods.

Wavy grain is produced when the direction of the fibers is constantly changing or undulating such that, when the timber is split, the line of the

split appears as a wavy line instead of a straight line as one would expect.

FIGURE — The term 'grain' is frequently misused for FIGURE in referring to the natural design or unique markings that appear on the surface of the wood. This pattern is not the 'grain' of the wood, but more accurately the FIGURE. Of all attributes of the gunstock the figure in the wood is considered first and appeals most to the admirer of a fine custom gun. Figure and grain pattern may sometimes be used interchangeably without serious error since grain direction plays such an important role in what kind of figure may appear to the eye of the observer. Generally it is the grain pattern and color combined to form the resulting figure, the most important and unique characteristic of the gunstock blank.

Figure results from the interaction of several factors or conditions present in the growing environment of the tree. Some of the major contributing factors are the type of minerals in the soil, intensity and direction of the prevailing winds, density and location of other trees in the surrounding area, the amount of sunshine, water, abuse, or damage. These all contribute to the growth rate of the tree, pigment distribution, internal grain/structure and consequently the resulting figure which is of the greatest interest to the custom stockmaker.

Particularly of importance on figure is the effect the different types of grain will have. Different types of grain such as an irregular grain may give rise to blister or a quilted figure; interlocked grain produces striped or ribbon figure; wavy grain shows up as a fiddleback figure; and a combination of wavy and interlocked grain produces a broken ripple on quarter sawed surfaces called rope or broken fiddleback. Among the more common figure names we find mottle, snail, tigertail, marble-cake, bird's-eye, quilted, crotch, feather-crotch, swirl-crotch, moonshine, stump wood, burl, pigment, fiddleback, and broken-fiddleback to name a few.

Areas where the most figure can be expected in the overall tree is the stump, (or buttress as the botanical folks call it), crotch, and burl. Fiddleback figure in the walnuts may be found throughout the tree, even in the straight growth areas of the main trunk or a large limb. Bird's-eye, quilted, or curly figure may be found throughout a large maple.

The stump of the tree usually has good figure in the region where the buttress swells near ground level at the root junction. Many trees commonly have a crinkly, twisting, curly figure caused by the weight of the tree compressing and wrinkling the fibers. The walnuts, when

having good pigment distribution, result in outstanding figure and color contrast in this area. This is why a walnut stump is not cut, but dug out.

Among the most strikingly beautiful figure patterns for gunstock use are those exhibited in wood from the vicinity of the crotch, the place in the tree where the main stem, or trunk, forks to produce two smaller branches or stems. Here the wood fibers are twisted and crushed, creating various figures and grain structures plainly visible when the wood is cut into stock blanks. There are three prominent crotch type figures present where the shallow-throated "Y" occurs at the junction.

1. Feather-crotch
2. Moonshine-crotch
3. Swirl-crotch

Feather-crotch occurs just below the bifurcation as a result of the stem division and has an appearance of a group of feathers coming together on a central line. Moonshine-crotch comes from the same general area but is formed by a swirl in the grain distribution. Swirl-crotch is formed where the grain swirl fades into the normal growth.

Burls are responsible for the formation of a number of interesting and unusual natural figure designs. Burls are large wart-like abnormal growths on the trunk, limb, or a root very much like a wart or tumor in the human. This is generally believed to be caused by some kind of injury to the growing layer just under the bark. The injury causes the growing cells to divide, creating excess wood that makes little bumps; then the tree growth follows these contours producing the burl. The alignment of the wood fibers in these areas is very irregular and the burl is thus gnarled with an unusual figure. Most burls are too small or porous to have sufficient wood for a gunstock blank, but a few have been reported that were large enough. However, the irregular grain required the use to be limited to a two-piece type of stock using a drawbolt for attachment. Domestic wood species highly prized for their burl figure are maple, myrtle, redwood, and American black walnut.

Four specific types of growth features contribute to the figure in fine woods.

1. Figure attributed to the different growth increments (annual ring variations).
2. Figure resulting from the type of grain structure in straight grained wood (quarter sawed vs. slab sawed boards).
3. Figure traceable to uneven grain structure such as interlocked grain (ribbon), fiber undulation (fiddleback) and twisted grain (burls).

4. Figure as a result of unequal distribution of coloring materials (pigmentation streaks as found in myrtle).

Almost all woods, especially the hardwoods, exhibit some type of design or figure on a flat surface. This may only be the result of a difference between springwood and summerwood or a wet year or dry year reflected in the annual ring variations. On ring porous hardwoods conpicuous bands of summerwood will show this type of figure. Osage-orange and screwbean mesquite are examples of this figure.

Wood structure itself causes figure to be apparent. With slab sawed lumber, the figure exposed on the surface of the wood is a parabolic design, a pattern traceable to the differences in density between the springwood and summerwood growth in the moist part of the year. With a ring porous wood like persimmon or a semi-ring porous wood like American black walnut, the springwood is much more porous because of the presence of the large vessel elements produced by the rapid spring growth. The more dense areas, summer slow growth, are darker in color due to the smaller vessel elements.

Wood rays of grain show a ribbon shape on the surface of a quarter sawed piece of lumber such as beech or sycamore. With quarter sawed lumber the growth layer (rings) appears on the surface of the wood as parallel stripes running lengthwise.

Figure in straight-grained timber is almost totally dependent on the method of sawing. The examples that follow illustrate those types of figure which can occur when the wood grain deviates from the straight line, showing irregularities.

— Interlocking grain gives a characteristic striped or ribbon figure on a quarter sawed surface. This apparent wavy grain is not a difference in wood color but variations in the reflective qualities of the surface.

— Undulation in the direction of fiber alignment is what causes those beautiful curly maple gunstocks. Besides the curly figure, wavy, blister, quilted and bird's-eye figure are also caused by undulation in the maple wood fibers. Wavy and curly figure is most evident on quarter sawn material. When the undulations are very close and abrupt, the figure becomes fiddleback. If these patterns become intermittent, disappearing and then reappearing, the figure is called broken-fiddleback or rope. Maple and birch, two common native hardwoods, exhibit the blister figure on slab sawn lumber. A quilted figure, akin to the blister, occurs only in the bigleaf maple in useful quantities.

— An exceptionally beautiful figure called bird's-eye occurs on the slab sawed hard maples and on rare occasions in soft maples,

white ash and birch. Experts in wood technology are not wholly in agreement on the exact cause of the bird's-eye figure, but for the admirer of beautiful wood, it exists and is reasonably commonplace. The most probable and generally accepted origin is due to local sharp natural depressions or indentations in the growth rings of the wood fibers next to the bark, possibly caused by a fungal infection, accompanied by fiber distortion. After the depressions are formed, succeeding growth rings follow the same contour for many years of growth extending the indentations to the bark. This figure occurs more often in the hard maples than in any other species of hardwood.

Color, as the last type or cause of figure in fine woods, develops from uneven infiltration of pigment materials. The resulting streaks and splotches of color, believed to be due to interactions of the sap and minerals from the soil, give a distinctive and unique appearance to the wood. These color patterns usually, but not always, follow the grain and are often referred to as watermark. Blanks of myrtle are well known for their handsome light, dark, and multicolored zones giving a highly desirable pigmentation figure. Other common domestic woods occasionally having pigment figure are the walnuts, screwbean mesquite, and red gum.

TEXTURE — Another important physical property of wood is the texture. Texture pertains to the relative size or diameter of the cells or pores in the wood structure. Texture can be described as coarse, fine, even, or uneven. The difference between coarse and fine texture is based on the dimensions of the pores and the abundance of the rays. Timbers in which the pores (vessels) are wide, or rays broad, are said to be coarse-textured. When vessels are narrow, and rays thin, the timber is fine-textured. For example, note the following:

— Oak is coarse-textured.
— Black walnut is moderately coarse to medium-textured.
— American sycamore is fine-textured.
— Maple is very fine-textured.

Fine-textured woods need not be filled when finishing, but coarse and moderately coarse woods must be to obtain a high polish or lustrous finish. Some wood technologists prefer the use of coarse-grained and close-grained instead of coarse and fine-textured. This usage is more common in the older publications, and due care must be exercised to avoid conflict in describing wood characteristics. For example, some coarse-grained woods can be fine-textured, so use caution whenever applying these terms since they are not directly interchangeable.

COLOR — Color and its relationship with figure was discussed in the preceding section, but color from a practical viewpoint will be covered here. Color is important in a wood because it may enhance or distract from the decorative value of the timber. Ebony and walnut owe their desirability, at least in part, to their decorative colors. It is believed that color is caused largely by various infiltrates in the cell walls and/or reaction of these with the sap of the wood. Some infiltrates are extracted and used for dyes. Color of many woods undergoes a change when the timber is exposed to light, oxygen, or heat with the result that the exposed surfaces of these unfinished woods darken with age, while others fade. Finishing does not completely solve this dilemma, but it improves the situation. Black cherry is a good example of a wood that darkens with age. An experienced antique appraiser can date the time of manufacture of cherry furniture within a few years by noting how much it has darkened with age.

Grain is a far different thing than coloration. Color lines do not always flow with the grain line, although they usually run close to that followed by the grain. You get the finest grain, and often the finest coloration, from wood cut from the stump of the tree. The areas around a crotch and burls often yield beautiful figure and coloration patterns.

The same species of walnut will vary greatly in color and color combinations according to the area in which it has grown. Whether it was grown in California, Italy, France, or Turkey, color variations and smell of the sanded wood are widely different. Color of the same species will also vary according to the environmental conditions of the local of growth. This is explained by the fact the color is dependent on the presence or absence of extraneous minerals in the cell walls. Color is also dependent, to some extent, upon the soil type and chemical content of that soil as well.

CHAPTER III

WOOD GRADING

One of the most confusing systems in the whole of the gunstock wood business is grading of blanks. There are almost as many grades and grading systems as there are cutters and blank suppliers combined. Grades running from Special Select down through Exhibition, XXXX-S to a low grade most often called Utility, are found. Some wood purveyors, with local interest or business interconnection, have a common method of grade classification, especially in the higher grades of wood. Fajen/Bishop and Preslik/Cantwell are good examples of these where the origin of the organization or a friendly relationship resulted in a reasonably correlatable grading system. However, even with these there is no good comparison between the two or any of the others for that matter. Some dealers complicate matters further by grading English/French and Bastogne walnut with one system and the American black, Claro walnuts, and other woods with a different grading. Several other operators have independent grading systems that appear to be a combination of the others. Exhibition and Utility are about the only levels of grading having any semblance of comparison, with special grades like Presentation, Special Selection, AAA Fancy, AAA Select, and some suppliers using nothing more than, "This is better than my best grade, it's 'MANY Bucks'." Therefore with all this confusion, how can anyone compare a XXX blank with an AAA grade blank to find a meaningful price relationship. Even with the difficulty in separating some of the grades, many wood dealers have at least one, and often two, specially named grades higher than Exhibition.

These grading systems have probably been an outgrowth of the grading classes used by the different furniture and veneer manufacturing operations, or an attempt by one cutter or supplier to play the 'one-upsmanship' game on another, which has caused the stock blank buyer and supplier many big headaches. If there is one thing the gunstock wood industry needs it is a grading system that relies more on objective data and not so much on subjective approaches.

One importer of high-grade blanks from Turkey uses a star designation method of grading, where a no-star is about equivalent to the U.S. Utility grade and a five-star blank is about equal to the U.S.

Exhibition class. If a similar system of grading were to be adopted in the U.S. trade, it could be very useful and lead to a decent set of standards for ALL — suppliers, buyers, custom gun, and stockmakers.

With so much clutter in these haphazard grading methods, it is no wonder any one new to the field soon becomes discouraged and frustrated in attempting to decipher the meaning. As a result of the dilemma described above, a universal gunstock wood grading system is proposed that will at least be a small step in clearing up many of the problems of the multitude of existing systems. There are probably other ways and maybe better ways, but this is a way that can be adapted and incrementally incorporated into today's trade without upsetting current business operations. There would be no need to regrade wood already dried, marked and ready to market, but it would be a worthwhile step to grade and mark all new blanks with the new system before they are put in the ready-for-use bin or display rack. For a while it will probably be necessary to mark both the old and new grade on the blank until the new grading system gets wide trade acceptance.

The proposed universal system will be something on the order of the following:

Proposed	**West Coast**	**Warsaw**
0★ (no star)	Common	Utility
1★	X	Supreme
2★	XX	Deluxe
3★	XXX	'A' Fancy
4★	XXXX & 4X-S	'AA' Fancy
5★	Exhibition	'AAA' Fancy
6★	(Medal of Honor)	Special Select

The last West Coast grade name, enclosed in parenthesis, is a name suggested for the top of ALL grades of wood.

With this system a star-number rating is preassigned to a blank of the approximate frequency of natural occurrence of the harvested wood. This grading system at least has some scientific and logical basis since it is tied to the system of powers of 10. The following are examples:

Occurrence		**Grade**	**Name**
One for one	10^0	0★	Common
One in 10	10^1	1★	Select

One in 100	10^2	2★	Superior
One in 1000	10^3	3★	Deluxe
One in 10,000	10^4	4★	Supreme
One in 100,000	10^5	5★	Exhibition
One in 1 million	10^6	6★	Medal of Honor

(Grade names proposed by this author and others, are subject to change as the industry desires, as long as the star ratings are retained).

In this system there would be 7 grades, with the last being a new higher grade (name proposed by one of the active blank vendors) to accommodate a very few exceptionally rare blanks that have no grade classification in today's market.

Some questions are sure to arise relative to "Who has examined a million blanks and can certify this one to be one-in-a-million?" When you consider that wood experts like Jack Burres, Frank Pachmayr, Cloyce Davis, Andy Garner, Bob Starkey, Reinhart Fajen, and numerous others having big operations that have personally examined somewhere between 300,000 and 500,000 blanks each, individually, during their lifetime for a conservative estimate of 3 million blanks all told. It should be easy enough for these experts collectively to agree on a single blank being the best in a million and probably could pretty well certify on one being the best in 10 million. Furthermore, this group named is not the only ones involved with gunstock woods; there are many small operators that supply a 1000 blanks or fewer a year. These small operators, along with the many custom stockmakers, would reinforce this information to increase the total numbers to nearly 10 million. With this kind of rationale, 10 million is not nearly as big a number as you would have thought at first.

In addition to the standard requirements of ample length, thickness, and width, each rifle blank shall be free of obvious defects and excessive warpage. Each blank, in order to qualify for the respective star rating, must also fulfill the following for each star category:

0★—Clear straight grained wood with some sapwood.

1★—20% figure and up to 10% sapwood, none of which will appear on the profiled stock.

2★—60% figure with no sapwood on the profiled stock.

3★—100% figure and proper grain flow for good layout.

4★—Full figure with one or more figure patterns, excellent grain flow for perfect layout, texture and grain structure to allow capability of 24 lines per inch of checkering.

5★—Full figure with at least two figure types or one figure plus color contrast, excellent grain flow for perfect layout, texture and grain structure to allow capability of 30 lines per inch checkering.

6★—Full figure of two types combined with outstanding color contrast, perfect layout, a texture and grain structure to allow capability of 32 lines per inch of checkering.

All of the above are based on a rifle blank of uniform figure and grain flow for both sides of the blank. Deviations from the above requirements dictate a down grade of the blank at least one level. Proper grading for flawed or imperfect blanks having poor figure display or improper grain flow is important. For example, a blank having good figure or grain flow on one side but no pattern showing on the opposite side should be downgraded at least one grade lower. A rifle blank having poor grain flow either in the grip area or forend should be downgraded one or more levels to compensate for these imperfections. Two-piece blanks are generally acceptable with improper grain flow at the front end but should be downgraded at least one level to compensate for the discrepancy; so if your stock design is two-piece and the gun has a drawbolt, you should be able to get two grades better wood for the same money. If the stock design does not include the drawbolt assembly, due care needs to be exercised in blank selection to make sure the grain structure is satisfactory at the grip-receiver junction.

A review of the grading classes indicates that some grades in the 2★, 3★ and 4★ region may need to be subdivided to account for the variety and multitudes of blanks that can occur in this combination of color and figure. There is nothing wrong with a division in these grades to say 5 levels. We would, therefore, have a 4★1, 4★2, 3, 4, and a 4★5, where the 4★5 is just below the 5★ grade. This could be followed, as necessary, for each of the star grades to show a subgrade or class of any of the grades, so it would be possible to have a 5★5 grade of blank that would almost rate a 6★grading.

Some hardwoods have very thick sapwood, or light-colored wood that appears to be sapwood. Persimmon, Bastogne walnut, and, on rare occasions, English walnut are examples of these. In fact this

author has examined Bastogne blanks that were totally clear of heartwood and as light as any maple in color. If the blank is cut from the layer of light-colored wood next to the heartwood, it will make as good a stock as any other part of that tree. The criteria for grading of 0★ and 1★ are no longer applicable and grading shall be based entirely on figure, color, layout and grain flow.

Another problem always arises in grading of blanks, that is, one side has beautiful figure and/or color while the other side may be bland. In these cases the wood should be graded on an average between the two grades. For example, if one side is a 5★ and the other a 3★, this would be a final grade of 4★, the mean value of the two grades.

CHAPTER IV

GUNSTOCK WOODS

Woods described in this chapter are discussed with the primary focus on the use for gunstocks. Many of these woods have a multitude of other uses in veneer or furniture making, but luckily for the gun owners that adore and appreciate beautiful wood, the parts of the tree most suitable for the best gunstocks are not necessarily the highly sought after prize by the veneer/furniture manufacturer.

Recognition information is furnished for many of the walnuts to assist the novice cutter and avoid confusion among the various species. Each wood write-up also has some general description of its characteristics, color, grain, or figure classification. Known precautions or other special considerations are given along with specific or special applications.

CAUTION: Treat all strange woods with care and caution by use of gloves and breathing apparatus for protection from contact with the dust and wood particles until you are sure there is no toxic reaction caused by contact with the wood.

Numerical values of the technical data for each wood is given to permit a quick evaluation of the mechanical characteristics and to allow a judgment of its capability of fulfilling a specified application.

Hd 1010—Hardness (side)
SR 10.7—Shock Resistance/Shock Rating
Wt 38/.55—Weight (Pounds per cubic foot)/Specific Gravity
VS 10.7%—Volumetric Shrinkage
St 1370—Shear Strength

If a blank, ( ), occurs, the data was not available; if the value is enclosed in parenthesis (XXX), the data is either uncertain or estimated. In most cases numbers are used in relative form (larger or smaller) rather than the absolute value. In some cases it will be necessary to deal with the absolute values as discussed further in Chapter VII.

Scientific (Latin) botanical names have been used for two reasons: (1) to assure no possible mix-up in communication with those outside the U.S. where the common names may be different; (2) to give the text some added technical credibility.

Tree names have been a problem throughout the years because of historical factors and failure of botanists in different parts of the world to agree on a uniform standard. Common names which are well understood in some localities are often applied to an entirely different species in others. Even Latin names considered to be standard and applied to important tree species for many years, have been changed during the last quarter century to comply with certain botanical precedence. The names used herein are those of most common usage, both in the scientific and common form. Even though there is some name disagreement in the literature, with the exception of a very few scientific designators, those used here are the most commonly accepted American nomenclature. Where a choice had to be made between two names, the one of most recent date of publication is used in hope of giving the most information to the cutter and stockmaker.

A listing of the significant woods described in the chapter is furnished, along with available data, at the end to allow a quick and ready reference for you to find the general information or data needed to evaluate a wood.

* * *

ACACIA BURL

See the write-up on myrtle later in this chapter.

AFRICAN BLACK WALNUT

A misnamed false walnut, imported from Africa, known in the lumber trade as mansonia is described later in this chapter.

AFRICAN MAHOGANY
Khaya spp.

There are many woods of the *Khaya* genera known as African mahogany. The two species that are harder and most dense that are probably best suited for gunstock woods are *K. grandifoliola* and *K.*

senegalensis, which are sometimes known as beninwood, benin mahogany and Senegal mahogany.

Hd 1350—SR (6.4)—Wt 46/.60—VS 7.0%—St ( )

These trees grow to 130 feet in height and 5 feet in diameter with boles sometimes twisted or crooked with low branching. Growth distribution is from the drier areas of West Africa to Uganda and Tanzania. Heartwood is uniform in color from pink to reddish-brown, darkening with age to a rich mahogany brown. The sapwood is lighter and not always sharply defined. Wood texture is moderately coarse; the grain is generally straight but may be irregular or interlocked. Wood is offered in figure with broken stripe, mottle, fiddleback, fine crotch, and faux swirl. This timber dries easily with little or no degradation and glues with no difficulty.

Two other African species are *K. ivorensis* and *K. anthotheca* which grow to be larger trees, but the wood is less dense. CAUTION: DUST FROM *K. anthotheca* MAY BE A SKIN IRRITANT.

Hd 900—SR 9.8—Wt 32/.44—VS (5.7)%—St 1700

These trees grow to 200 feet tall, with 90 feet boles, and trunk diameters of 6 feet. Heartwood is pinkish-brown, darkening on exposure to a reddish-brown. Sapwood is whitish or yellowish and not always sharply demarcated. Wood texture is medium to coarse; grain is straight to interlocked, producing a stripe figure. This wood dries rapidly with little degrade. Glueing properties are good and an excellent finish is readily obtainable.

AFRICAN WALNUT

Lovoa trichilioides

Hd 940—SR (6.6)—Wt 34/.45—VS 5.4%—St ( )

This is not a true walnut but a misnamed wood belonging to the mahogany family (but not a true mahogany either) grown in tropical West Africa and also called tigerwood, Congowood, and lovoa in the U.S. and sometimes misnamed benin. Trees grow to 150 feet high and 4 feet in diameter. Heartwood is yellowish-brown sometimes marked with dark streaks or veins. Texture is fine to medium with an

interlocking grain having an attractive ribbon figure. It is easy to work with sharp tools and has good glueing properties.

ALMOND

Prunus amygdalus

Hd ( )—SR 18—Wt 42/( )—VS ( )%—St ( )

This is a peculiar kind of peach with a thick skin; it has almost no pulp or juice and a stone with a large kernel that is not bitter like the seed of a true peach. It is a member of the rose family, which also includes apple, cherry, pear, peach, quince, loquat, plum, apricot, and prune. The almond apparently originated in southeastern Asia where it grew wild with the pistachio shrubs in such countries as Iraq, Jordan, and Turkey. It was introduced in California from Mexico and Spain, but it died out. New varieties were introduced in 1843, which have produced well since that date.

Most almond stockwood is imported from Cuba as thick lumber and is not widely used since there are so many other available woods that are superior. This heavy wood is light gray to yellowish-gray in color; the grain is fairly fine but open, necessitating filling when finishing. It has good figure with a wavy grain predominating. It is also strong and will withstand the shock of heavy recoil.

AMERICAN ASH

See the white ash write-up in this chapter.

AMERICAN BLACK WALNUT

Juglans nigra

Hd 1010—SR 10.7—Wt 38/.55—VS 10.2%—St 1370

American black walnut is the terminology used for this wood throughout to avoid confusion with other black walnuts such as California black and some others that are misnomers. Figure 7 shows

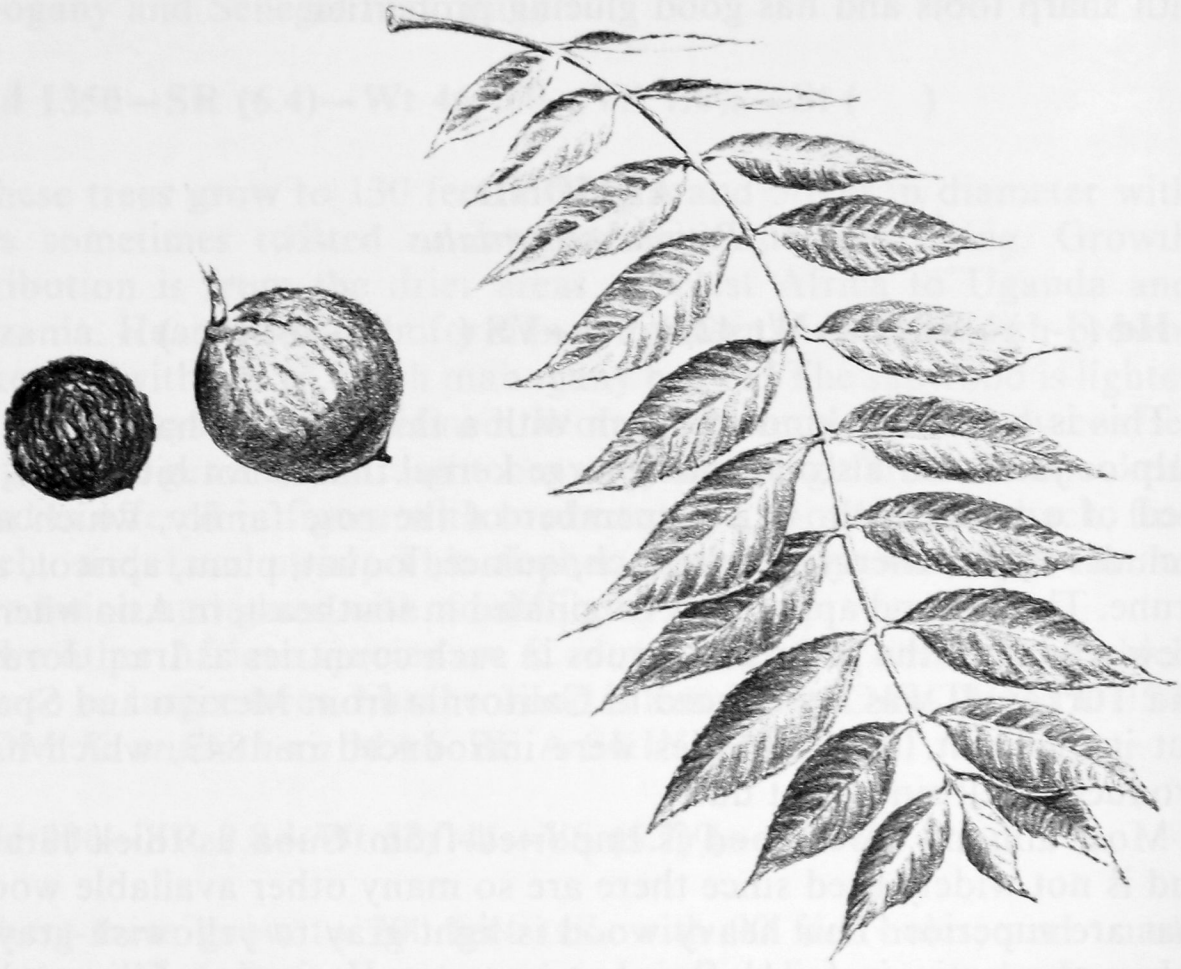


Figure 7. American Black Walnut Leaf and Nut System

the nut and leaf structure of the American black walnut. The compound leaf of this type is typical of the true walnuts; the only significant difference is the number, size of leaf, and leaflets. In the case of the American black the total leaf length is 12 to 24″, with 15-23 leaflets 1 to 1½″ wide, and 3 to 3½″ long. The nut when ripe is covered with a smooth, soft, black, outer hull, and a sealed husk which is difficult and messy to remove. The nut itself is about 1″ in diameter, black, ridged, thick shelled, and difficult to crack to obtain the wholesome kernel.

This American hardwood grows extensively throughout the U.S. especially east of the Rockies and in Oregon and Washington. Trees grow to be 150 feet tall and as much as 8 feet in diameter. Classed as a heavy wood, averaging 38 pounds per cubic foot, American black walnut is strong and stiff, and it has good shock resisting capability. It is stable, holds its shape well after proper seasoning, and it works well with hand and machine tools. The heartwood is chocolate brown

and occasionally has darker, sometimes purplish streaks. This hardwood finishes beautifully with a wide variety of handsome figure and grain structure. It is moderately coarse to medium-textured and frequently needs to be filled to seal the open grain when finishing.

American black is the overwhelming choice by today's American shooters for their gunstocks. Even the lower grades, translating to lower cost, make sturdy useable stocks that perform the purpose; cost does not necessarily make a better stock — it just adds to the beauty and value of the gun. American black walnut offers light and dark contrasting color, fiddleback, fiddleback curl, stump figure, feather crotch, sunburst, and all combinations of the foregoing. Plain grained walnut also varies widely in overall color from a very light tan, through tan, brown, dark brown, reddish-brown, and mahogany hues. American black and its native west coast relative Claro, are unique in that they develop unusually beautiful contrasting figure and color, especially in stump and crotch areas of the tree. Fiddleback figure shows up in strong vertical, tiger-like stripes. Its inherent beauty in figure and color, along with its strength and shock resisting ability without excessive weight, explains its wide acceptance for gunstock use.

Even though the American black walnut is third or fourth in preference of choice by custom stockmakers, it is still popular with the U.S. production gunmakers. This wood checkers in an excellent manner but its main deficiency is in its inability to take fine-line checkering. Eighteen or 20 lines per inch is about the maximum the average hardness American black will withstand without "fuzzing-up." As a walnut it is exceeded in shock resistance or shock rating by Bastogne and checkering capability only by the English and Bastogne walnuts, but it has satisfactory shock rating for the standard length 30 calibers such as the 30-06. In spite of these deficiencies some of the smallest grained, hardest, and densest walnut available is some cuts of the American black. Some especially hard and dense woods are harvested in Oregon, Washington, and northern California.

Despite the superiority of other walnuts, there are, however, some guns that should be stocked only with American black walnut. The American classics like the Winchester 12, 42, and 21, L.C. Smith, Parker, and Fox guns just would not look natural with some fancy English or Circassian wood. Figure 8 shows an example of a highly figured American black walnut in blank form and then the completed stock on a fine Winchester model 42 shotgun.

In spite of the ravages of gunmakers for 200 years and furniture makers and occasional other uses, there is still a suprisingly sufficient

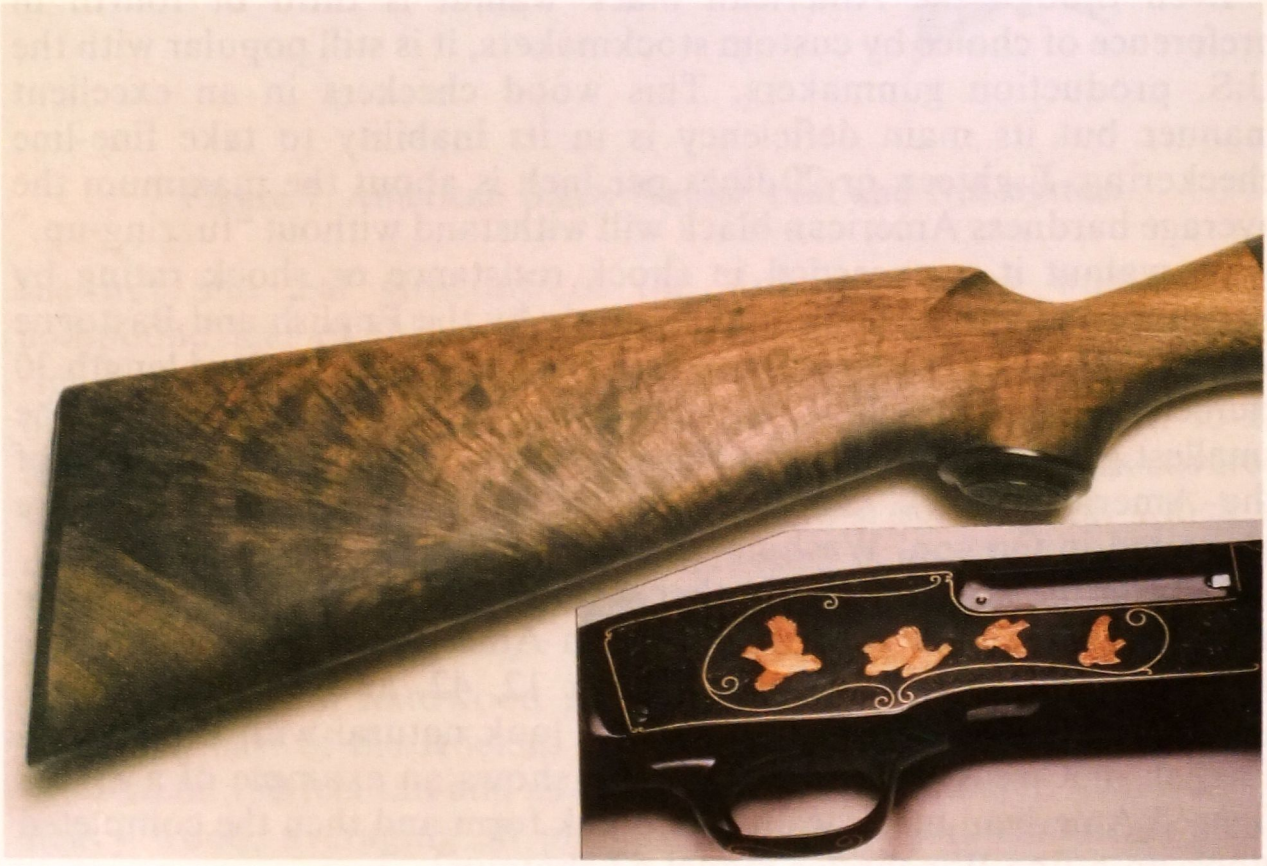


Figure 8. An American Black Walnut Blank and the Finished Stock on a Model 42 Winchester Shotgun

supply of American black walnut available. Most of it today is cut in the Ozark Mountain area of northern Arkansas and southern Missouri. Oklahoma trees produce a small number of quality blanks, but trees further south, perhaps Texas, Louisiana, and Mississippi, grow too fast and are too soft to be good gunstock material. Even though the gunmakers are gobbling up prodigious quantities of these trees annually, the supply continues to hold up.

AMERICAN CHESTNUT

Castanea dentata

Hd 540—SR 6.5—Wt 30/.43—VS 9.3%—St 1080

Before the blight, the American Chestnut was widespread in distribution being found south from Maine throughout the northern states to the foothills of the Appalachian Mountains and west as far as southern Michigan through Indiana to northern Mississippi. New growth are mostly from old root systems and are not nearly so widespread. A few trees 6 feet in diameter and 80 feet high are found here and there. Heartwood is a reddish-brown in color, coarse grained, light in weight, and relatively weak.

AMERICAN ELM

Ulmus americana

Hd 830—SR 13.0—Wt 34/.50—VS 11.7%—St 1510

This is the largest and most abundant of all the elm species of North America. It is also known as the white elm, and sometimes as water or soft elm. This tree is native to all of the eastern U.S. and west of the Mississippi in Texas, Oklahoma, Kansas, and up the Missouri River valley to Montana. Wood is light brown, moderately heavy, hard, tough, and so cross-grained as to be difficult to split. This wood has been used for wheel hubs, shipbuilding, sporting goods, boxes, and crates.

ANCONA WALNUT
Juglans regia

This is a variety of cultivar of the English walnut planted in California for production of edible nuts.

APPLE
Malus pumila

Hd 1730—SR 23.0—Wt 46/.74—VS 14.7%—St 1740

This light reddish-brown hardwood has good potential for use as a gunstock wood. This wood is obtained from either wild or domesticated trees and is often found in gray or grayish-white aged planks. This wood, sadly lacking in figure or color, is strong and withstands shock well.

ARIZONA WALNUT
Juglans major

Hd (1010)—SR (10.7)—Wt (38/.55)—VS (10.2)%—St (1370)

This single trunk walnut tree is native to Arizona and northwestern Mexico, west Texas and New Mexico. It may reach 75 feet in height and 3 feet in diameter. Figure 7 shows the typical walnut leaf pattern. The Arizona will have an overall length of 8-10″ with 9-13 leaflets 3-4″ long and 1 to 1¼″ wide. The fruit is almost egg-shaped with a thick husk. The thick-shelled nut is a brown to black color with deep broad lengthwise grooves. It is 1 to 1½″ in diameter with a slight point opposite the base. Known as nogal in Mexico this tree is credited with providing the name 'Nogales' for the city in southern Arizona. Wood is equivalent to the American black walnut and if it is readily available in adequate size and supply it could be useful for gunstock wood.

ASH
Fraxinus spp.

There are about 70 species of ash distributed throughout the

northern hemisphere of the genus *Fraxinus*. Twenty of these species are found in North America, but most of the commerce in ash is done in the three species of white, black, and green. See these listings later in this chapter for further information on the one of interest.

ASHLEY WALNUT
Juglans regia

This is a cultivar, brand name, of an English walnut grown in California for nut production.

ASIAN WALNUT
Juglans regia

This is another name commonly applied to the English and Persian walnut in an endeavor to define its probable origin.

ASPEN
Populus tremuloides

Hd 350—SR 7.6—Wt 27/.38—VS 9.3%—St 850

This is the most widely distributed of the deciduous native trees of America growing at all elevations up to 10,000 feet in many soil types. Trees grow to be 80 feet high and 24 inches in diameter. Trees spread freely by means of root suckers and often form large thickets. The wood is light in weight, almost white in color, and rather weak. Texture of this wood is fine and even; it is widely used for making crates, matches, and excelsior. Aspen bark is a favorite food of the beaver.

AUSTRALIAN WALNUT
Endiandra palmerstonii

This wood is not a true walnut and it is better known as orientalwood, which is described later in this chapter.

BALD CYRPESS

Taxodium distichum

Hd 510—SR 8.2—Wt 28/.46—VS 8.4%—St 1000

This large swamp tree with a swollen base is a native American softwood with a needlelike leaf but deciduous in nature. These trees grow in the wet coastal regions of the east coast and Gulf of Mexico. Trees up to 150 feet in height and 12 feet in diameter are found. This tree develops a peculiar root system that produces irregular conical structures, called 'knees', the function of which is not definitely known. This is a soft wood with narrow ringed texture which has a color of pale brown to reddish-brown. Cypress is stronger than most soft woods and is easily worked. Some timbers have exceptional figure and color contrast, especially those that have seasoned under water. The wood feels waxy or greasy with a peculiarly rancid odor.

BASSWOOD

Tilia americana

Hd 410—SR 7.2—Wt 26/.37—VS ( )%—St 990

The basswood is a lightweight hardwood, also known as bass and linden. This, the softest of the hardwoods, is weak, moderately stiff, and low in resistance to shock. It grows in the northeastern U.S. in trees up to 80 feet tall and as much as 3 feet in diameter. The heartwood has a creamy brown to sometimes a reddish-brown color, with a particularly attractive variety of colors that tend toward a rather light yellowish-brown, sometimes highlighted with streaks of a deeper color. Its very small pores allow finishing without filling. This wood accepts stain well if a darker color is desired. Basswood containers impart no odor or taste to their contents.

BASTOGNE WALNUT

Juglans regia + Juglans hindsii

Hd 1460—SR (12.3)—Wt 42/( )—VS ( )%—St ( )

In order to develop a seedling tree of root stock that thrived in

Figure 9. Bastogne Walnut in Blank Form and the Finished Stock on an Engraved Mauser 98 Rifle

California soil and climate, nuts from the Claro walnut tree were planted and raised to 2 or 3 years of age before grafting the English scion onto the seedling root. Early in these plantings it was noticed that, once in perhaps 100 times, strange looking rootlings appeared, different from the Claro seedlings in many respects. Botanists determined this strange plant to be a hybrid, the result of natural cross-pollination between the English, *Juglans regia* and Claro, *Juglans hindsii* walnuts. Luther Burbank nicknamed this strange plant the 'PARADOX' walnut, but Bastogne, the French equivalent of 'bastard,' is the most common name used by today's stockmakers.

The resultant tree is like neither parent. Bastogne is a low umbrella-shaped tree of healthy vigorous growth, which is planted primarily for shade since it has little value as a nut producer. Trees grow so fast that it is not unusual to find growth rings as wide as 2″ and sapwood up to 12″ thick. In spite of the fast growth rate, Bastogne is somewhat heavier, denser, and stronger than either parent. It is possible to cut a fine quarter sawed blank entirely from the sapwood. This author recently examined such a blank, as white as maple, fiddleback from butt to tip, and harder than any English wood. Choice blanks generally have better grain flow and orientation than other suitable walnuts, a characteristic making them desirable for rifle blanks. This hard dense wood is especially suited for the magnum type rifles with heavy recoil.

The color of the Bastogne wood runs from very light, bland white of the English sapwood through all the possible colors of Claro to the darkest hues of the English woods. Along with these wide color variations and their gamut of figure possibilities, magnificent figure and contrast are found, with the most prized figure being the basket weave or checkerboard.

Bastogne walnut is most likely the finest gunstock wood in the world available to the custom gunsmith and certainly the scarcest; it is satisfactory for use on the most elegant custom guns. The top portion of figure 9 shows an Exhibition grade Bastogne blank with unusual figure and color. The lower photo shows a high-grade bolt action rifle with this same piece of Bastogne transformed into a fine gunstock. Note the strong fiddleback pattern above the dark line with almost no figure below the line.

BEARBERRY

This is another name for cascara which is described later in this chapter.

BEARWOOD

This is another name for cascara. See the write-up later in this chapter.

BEECH

Fagus grandifolia

Hd 1300—SR 15.1—Wt 45/.64—VS 13%—St 2010

One of the heavy woods, beech has a high rating in strength and shock resistance, and it can be readily bent when steamed. Beech is subject to much shrinkage; therefore it requires considerable care during seasoning if checks, warp, and discolorations are to be avoided. Low in resistance to decay, this white colored wood with a reddish-brown tinge is close-grained with a fine texture and was commonly used as a gunstock wood before 1900. It grows mainly in the eastern U.S. and trees are 100 feet in height and more than 3 feet in diameter. Filling is not necessary when finishing because of the fine texture. Beech is an excellent substitute for sugar maple in furniture or other uses.

BENIN MAHOGANY

See the African mahogany write-up earlier in this chapter.

BENINWOOD

See the African mahogany write-up earlier in this chapter.

BIGLEAF MAPLE

Acer macrophyllum

Hd 850—SR 7.8—Wt 34/.48—VS ( )%—St 1730

(Note: These mechanical characteristics are average, but selected

trees harvested from dry hillsides or ridge areas will have much greater density, will be harder, and will have a higher shock resistance value. In fact some cutters are convinced this increase is more than 10% overall.)

Native to the northwestern coastal regions of the U.S., these trees grow to 60 feet in height and 5 feet in diameter; some are 200 years old. Often called many other names, such as broadleaf, California, Oregon, Pacific, and western maple, this tree has a simple opposite leaf which is the largest leaf of the American maples. Leaves are 6 to 12 inches long and somewhat broader than long. Even though this wood is classed with the soft maples, it is durable, strong, and noted for being warp-free. Bigleaf maple is fine-textured, and the trees are fairly commonplace in its native area but only one tree in several thousand develops figure to yield a quality log. Even if it is one of the soft maples, the denser woods are used extensively for gunstocks with excellent results. Heartwood is light tan to white, with a tinge of red, and has a wide variety of figure types. Choice of these runs from fiddleback to quilt to the rare tortoise or seashell. Being of firm, fine texture, this wood takes a high polish and can be flamed, stained, or finished natural. Common cuts of the wood, being soft, are difficult to checker and obtain a fine finish, so the harder and denser blanks of the bigleaf maple should always be selected if these are requirements of your stock.

BIRCH, YELLOW

See the yellow birch write-up in this chapter.

BIRD'S-EYE MAPLE

This is a special type of figure found in the native hard maples. This figure has the appearance of tiny 'eyes' throughout the wood and makes a fine stockwood as well as forearm tips and grip-cap decorators for stocks of the darker woods. Bird's-eye figure is believed to be caused by a fungal infection, just between the bark and sapwood, giving rise to small depressions in the tangential pattern of the grain. After the depressions are formed, succeeding growth rings follow the

same contours for many years extending the indentations outward from the heart. The figure occurs more often in the hard maples than any other species of wood.

BITTERBARK

See the cascara write-up in this chapter.

BLACK ASH

Fraxinus nigra

Hd 850—SR 14.9—Wt 35/.49—VS ( )%—St 1570

This hardwood is also called brown ash, basket ash, hoop ash and grows in the northeastern U.S. and north to Canada. Trees grow to heights of 90 feet with trunk diameters of 20 inches and up. Excellent in shock resistance, it was once used to weave baskets; it now finds wide use for tool handles and ball bats. Its color varies from a grayish-brown to light brown; it is straight grained with clusters of scattered eyes, and it often produces valuable burls.

BLACK CHERRY

Prunus serotina

Hd 950—SR 11.4—Wt 33/.50—VS 9.2%—St 1700

This hardwood tree is also known as wild cherry, choke cherry, and American mahogany. It is native to the eastern U.S. where it grows wild with other forest trees to heights of 100 feet and up to 5 feet in diameter. Considered on par with the American black walnut as a gunstock wood, it has been approved as a suitable alternate for use on military arms for the armed forces. This wood is heavy, hard, strong, and fine-textured having a light red to a dark reddish-brown color. It makes a beautiful gunstock, satisfactory for use on all rifles except the heavy recoil magnums. It is especially desirable for use on the old flint-lock rifles. Since it is fine-textured, no filling is necessary on

finishing. Black cherry sands to a glasslike smoothness and is easy to stain if a darker shade is desired. It checkers clean and sharp and holds up well in use. With age the reddish-brown color of the cherry turns to a darker red and the age of a piece of furniture can be accurately judged by the extent of this color change. Figure 10 shows an example of the black cherry in block form and then as a finished gunstock.

BLACK GUM

Nyssa sylvatica

This is a native American hardwood, which is also called black tupelo, sour gum, and pepperidge. It grows in a wide variety of soils throughout most of the U.S. east of the Mississippi River except northern New York, Maine, Vermont, and New Hampshire. It is also found in parts of Missouri and Texas and all of Louisiana and Arkansas. Trees grow to 110 feet in height and 5 feet in diameter with the best growth occurring in the southern Appalachian mountain regions of Tennessee and North Carolina.

Color of the heartwood runs from a light yellow to a light brown with a twisted or interlocked grain that makes it difficult to split. Annual growth rings are not very evident when examining a cut off end for age.

Black gum was once used for ox yokes and chopping bowls but now it is used in flooring, rollers in the glass factories, hatter's blocks, gunstocks, and pistol grips.

BLACK LOCUST

Robinia pseudoacacia

Hd 1700—SR 18.4—Wt 48/.69—VS 8.2%—St 2480

This hardwood, also called yellow locust and false acacia, grows in two small areas of the midwestern and eastern U.S. Trees grow to be 80 feet high and 4 feet in diameter and live to 100 years of age. It has a yellow to light golden brown coarse-textured heartwood which is strong, very hard, and durable. Freshly cut heartwood is a greenish-yellow to dark brown but bleaches lighter with exposure to light.

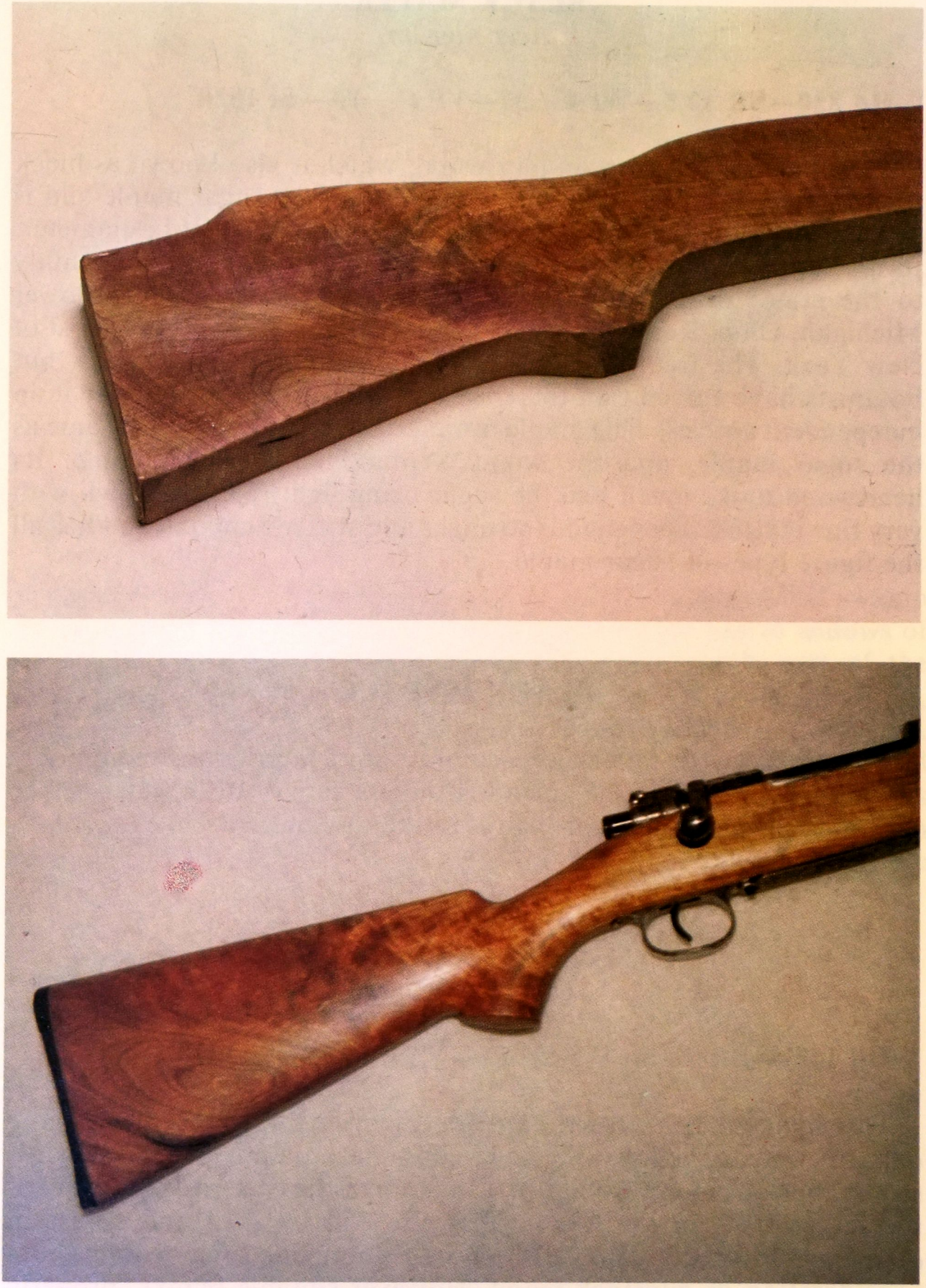


Figure 10. A High-Grade Black Cherry Blank and the Finished Stock for a Mauser 98 Rifle

BLACK MAPLE

Acer nigrum

Hd 850—SR 12.5—Wt 43/.57—VS ( )%—St 1820

This is a native American hardwood, which is also known as black sugar maple. It is less widely distributed than the sugar maple and is smaller in size, being only about 100 feet high and 3 feet in diameter. Its distribution is not as far north or south as the sugar, limited mainly to the states of Iowa, parts of Missouri, Illinois, Indiana, lower Michigan, Ohio, Kentucky, West Virginia, Pennsylvania, and most of New York. The tree resembles the sugar maple in many ways, but botanists have agreed that there are enough differences to make it an independent species. This maple produces syrup and sugar the same as the sugar maple, and the wood is marketed as hard maple. Its heartwood looks much like the sugar being light reddish-brown with very fine texture. The wood is stronger and stiffer than oak and has all the figure types of sugar maple.

BLACK MYRTLE

The black myrtle is a special coloration of myrtle most commonly obtained by seasoning the green logs in a stream of fresh water before they are cut into lumber or blanks at the saw mill.

BLACK OAK

Quercus velutina

Hd 1400—SR 13.8—Wt 45/.61—VS ( )%—St 1900

This light reddish-brown hardwood is also known as smoothburr oak, quercitron, yellow ash, and yellow bark oak. This heavy, hard, strong, but not tough wood grows mainly in the eastern U.S. Some of the larger trees in the Ohio valley are 150 feet tall and 5 feet in diameter. First thoughts lead one to eliminate such woods from consideration as gunstock wood. However suitable blanks, properly seasoned before final shaping, and finished in a manner to overcome the coarse texture could result in utilitarian stocks at a reasonable cost.

BLACK TUPELO

See the write-up on black gum earlier in this chapter.

BLACK WALNUT

This is a generic name applied to the native American black walnut to distinguish the wood from other walnuts commonly found in the U.S. such as the Claro or English walnuts grown in California.

BLACK WILLOW

Salix nigra

Hd (420)—SR 8.8—Wt 26/.34—VS ( )%—St 1250

Black willow is a hardwood native to the U.S., also called swamp walnut, and is the most common and largest of the native willows of about 30 species of the genus *Salix*. It grows mainly east of the Mississippi River but also in areas of Iowa, Kansas, Missouri, Oklahoma, Arkansas, Louisiana, and Texas west of the Mississippi. Trees in the lower Mississippi valley grow to be 4 feet in diameter and 100 feet high. Black willow is a moderately soft wood, but it has median value of shock resistance. Its heartwood is light brown to a pale reddish-brown or brown, frequently with darker streaks along the grain.

BLUSH WALNUT

Beilschmiedia obtusifolia

This misnamed tree is a false walnut that grows in Australia.

BOIS D'ARC

This is a name given to the native American hardwood osage-orange by the French explorers, which means "Wood of the bow."

BRAZILIAN WALNUT

The Brazilian walnut is not a true walnut, but a misnomer for a wood very much like the American black walnut in color and mechanical characteristics; it is better known as imbuya. See the write-up on imbuya later in this chapter.

BROADLEAF MAPLE

See the bigleaf maple write-up in this chapter.

BUCKEYE, YELLOW

See the yellow buckeye write-up later in this chapter.

BUTTERNUT

Juglans cinerea

Hd 490—SR 8.2—Wt 27/.38—VS 8.5%—St 1170

This hardwood nut tree is also called white walnut and has a typical leaf configuration as shown in figure 7 with an overall length of 15-30″, 11-17 leaflets 1½-2″ wide, and 2-3″ long. Under ideal growing conditions the butternut tree grows to 100 feet in height and 4 feet in diameter. This wood makes fine looking paneling and furniture and has been used to make coffins, gunstocks, small house timbers, and post rails. This light brown to light chestnut brown wood, with occasional traces of dark red streaks, takes stain well if a darker shade is needed. Its soft wood, coarse texture, and large open pores eliminate its wide use as a gunstock material.

CALIFORNIA BLACK WALNUT

Juglans hindsii

The California black walnut is really the Hinds walnut, but better

known to the cutter and stockmaker as Claro walnut, described later in this chapter.

CALIFORNIA ENGLISH WALNUT

Juglans regia

Hd 1200—SR 9.8—Wt 40/( )—VS ( )%—St 1320

The domestic variety of Persian, or Asian, walnut grown in California and southern Oregon is known as California English walnut. This distinction is made here between the California English and the other English walnuts to emphasize the changes in the strain in nut production over the centuries. Figure 11 shows a typical leaf and nut configuration of this *Juglans regia* species which produces the most gunstock woods available throughout the world today. The general leaf configurations found are 8-16″ long, with 7-9 leaflets 2-5″ long,

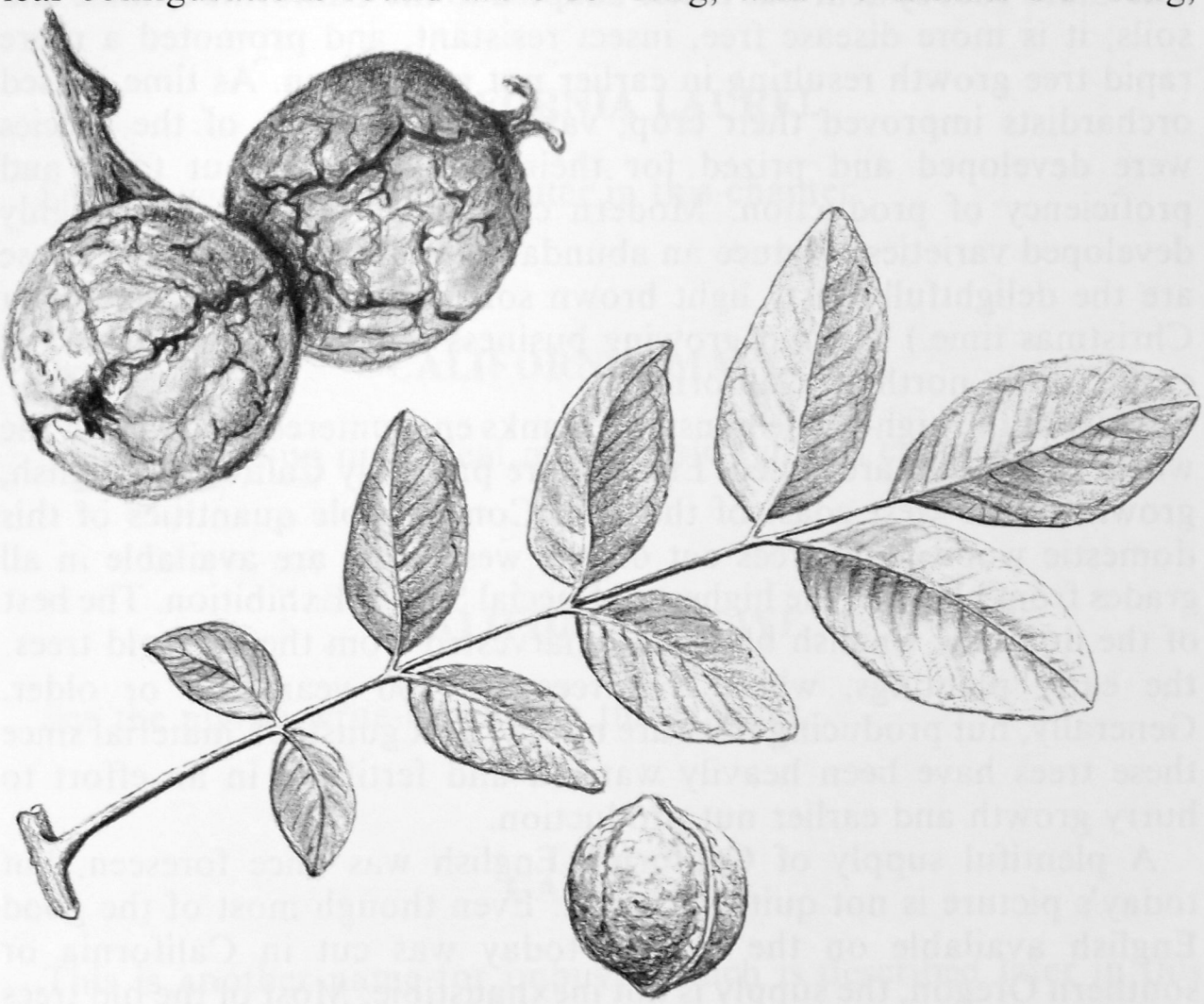


Figure 11. The English Walnut Nut and Leaf Structure

and 1 to 2½″ wide; the terminal leaf is larger than any of the lateral leaves. The fruit is globular in shape and 1½ to 2″ in diameter. A thick husk surrounds the light brown nut, which is about 1″ in diameter and thin-shelled. Its surface is almost smooth with a slight point and a prominent ring of separation. It is a true descendent of the Persian walnut having been brought to this country by the English settlers in the early days of the new nation. In spite of several improvements in the strain, like the Carpathian variety, the Persian nut tree did not do well until it was planted in California where it flourished west of the Cascades and has been very productive in the growing of edible nuts. It is best known as English, partly for convenience and partly from custom, since the nut produced by the tree was also known as English walnut. The tree was known as the Persian walnut until the turn of the century when the nut name, English, prevailed over the tree name of Persian and became known as English walnut.

Many of the English nut orchards in California were started by grafting English walnut cuttings (scions) on the Claro walnut seedling. The Claro root system was better adapted to the California climate and soils; it is more disease free, insect resistant, and promoted a more rapid tree growth resulting in earlier nut production. As time passed orchardists improved their crop; various new strains of the species were developed and prized for their excellence of nut taste and proficiency of production. Modern cultivated trees of these highly developed varieties produce an abundant supply of tasty nuts. (These are the delightfully tasty light brown soft shelled nuts so popular at Christmas time.) The nut growing business remains to this day a big cash crop in northern California.

Most of the high-grade gunstock blanks encountered throughout the world today that are called 'English' are probably California English, grown on the west coast of the U.S. Considerable quantities of this domestic wood from trees cut on the west coast are available in all grades from bland to the highest of Special Select/Exhibition. The best of the domestic English blanks are harvested from the very old trees, the early plantings, where the trees are 100 years old or older. Generally, nut producing trees are not the best gunstock material since these trees have been heavily watered and fertilized in an effort to hurry growth and earlier nut production.

A plentiful supply of California English was once foreseen, but today's picture is not quite so bright. Even though most of the good English available on the market today was cut in California or southern Oregon, the supply is not inexhaustible. Most of the old trees of the early plantings are gone, and the intermediate replacement trees

are becoming available to harvest as well as a few shade and back lot trees. Economical operations force the nut grower to replace a tree when its nut production drops off, an action which, unfortunately, most often happens when the tree is too small to make gunstock blanks. Quality wood will be in good supply for several more years, and if one of the lumber or hardwood associations can be induced into a planting program, quality wood can be made available in the future for as long as needed.

Most custom stockmakers agree that the California English is every bit as good as the European and Turkish woods, and they are happy to have such a wide variety of California blanks available to choose from when a special requirement needs to be filled. For more information on this wood, see the section on *Juglans regia* in this chapter. Figure 12 is a set of color pictures of a high-grade California English blank showing the blank before the stockmaker began cutting and after the stock was finished and mated to the Merkel combination metal. Ed DeLorge of Thibodaux, Louisiana did the stock work.

CALIFORNIA LAUREL

See the write-up on myrtle later in this chapter.

CALIFORNIA MAPLE

See the write-up on bigleaf maple earlier in this chapter.

CALIFORNIA OLIVE

See the myrtle write-up later in this chapter.

CANELLA

This is another name for imbuya, which is described later in this chapter.

Figure 12. A California English Blank and the Finished Stock on a Merkel Combination Gun

CARPATHIAN WALNUT

Juglans regia

This is a strain of the English walnut adapted to the colder climates in the U.S. where it blooms later in the spring and survives much colder winters. Its origin can be traced directly to seed collected from the Carpathian mountains of Poland in the 1930's by Reverend Paul C. Carth.

CASCARA

Rhamnus purshiana

Hd 1040—SR 6.1—Wt 36/.( )—VS ( )%—St ( )

This is a hardwood, found only in the northwest coastal area of the U.S., which is also known as cascara buckthorn, cascara sagrada, bearberry, bearwood, bitterbark, and wahoo. This tree grows to 40 feet in height and as much as 3 feet in diameter. Heartwood is yellow to orange in color and is a good candidate to replace walnut, for low recoil rifles, as a gunstock wood if ample blank size is available in desired color, figure, and grain structure.

CATALPA, NORTHERN

See the northern catalpa write-up later in this chapter.

CHERRY, BLACK

See black cherry which is described earlier in this chapter.

CHESTNUT, AMERICAN

See the American chestnut write-up earlier in this chapter.

CHINESE WALNUT

Juglans regia

This tree was once believed to be a separate species, but botanists are now convinced that it is merely a variety, or strain, of the Persian, or English, walnut. This tree could, conceivably, be the forerunner or predecessor of all the *Juglans regia* walnut plants. There is evidence as to the original tree having been brought from eastern Asia to Persia before the birth of Christ and utilized for edible nut production.

CIRCASSIAN WALNUT

Juglans regia

Hd 1200—SR 9.8—Wt 40/( )—VS ( )%—St 1320

This mythical king of gunstock woods is a variety of the Persian walnut that grows in Turkey and the area at the southeast part of the Black Sea, which is now Russian Georgia, where the walnut most likely got its name. It is the parent of all European walnuts via Italy and England. These trees are huge, due to age, and produce some exceptionally fine blanks. Many Circassian stockwoods marketed today are most likely some form of English walnut grown in California. A rare genuine Circassian blank is encountered now and then that has found its way to the U.S. from Russia, Turkey, or it may have been cut right on the border of Iran.

Just after World War II, one wood vendor extolled the merits of his Circassian walnut as being "The World renowned Circassian . . . the very finest of all stockwoods. Every blank features the rich color and tight grain found exclusively in beautiful Circassian walnut. One of the few stockwoods that will hold a sharp 32 lines to-the-inch checkering." An exhibition blank was described as "The rare and very finest grade available. Beautifully colored with deep rich dark smoky grain running the full length of the stock."

This wood has a rich brown color with a distinct figure and color pattern which is used as a basis for calling some California English blanks 'Circassian.' Like all *Juglans regia* this wood ranks at the top of the list for use by the custom stockmaker. This fine and firm wood checkers well and is one of the top woods in this respect. See the section on *Juglans regia* for more information on this wood as adapted to gunstock usage. Figure 13 shows a high-grade Circassian blank before the custom stockmaker started and then the completed stock installed on a Ruger #1 rifle.

Figure 13. An Excellent Example of Circassian Walnut in Blank Form and Then as it Appears Finished on the Gun

CLARO WALNUT

Juglans hindsii

Hd (990)—SR 9.0—Wt 35/( )—VS ( )%—St (1300)

The name 'CLARO' probably comes from the Spanish influence in early California history when the Catholic Padres were building the west coast missions. Many of the west coast walnut trees were planted by these builders and their followers. But the exact application of the word 'CLARO,' which means mild, light, or bright in Spanish, to the tree is not clear. Bright certainly could describe the wood since it exhibits such an assortment of hues and shades of color. How this came to be applied to this native California walnut remains a bit of a mystery today. No distinction is made in the wood trade between the California black walnut and the Hinds walnut. Therefore Claro has been the common name applied interchangeably to both for many years. It is believed that one reason for this was to distinguish this native California walnut from the English (known then as Persian walnut) and the American black walnut. The term Claro walnut, as used throughout this text, (is really the same tree called a different name), refers to either or both the Hinds or California black walnut.

The origin of the tree is shrouded with some mystery. Of all the theories to account for the existence of Claro, more are fancy than fact. One fact of historical record is that the Claro walnut was discovered and named 'HINDS' by the British botanist Richard B. Hinds in 1847.

Although the original range of Claro was very limited, it has been planted throughout the Sacramento Valley and north to Oregon. This native American tree produces S-O-M-E beautiful gunstock wood. Pigmentation is notably reddish cast with sharp contrasts of color running from yellow through ocher to tan and purplish-black in solids or streaks throughout the figure. Figure types are curly, fiddleback, and feather-crotch with a rare blank having a ribbon or rope figure with a multitude of color mix. For sheer vibrance and depth of color and figure, no other wood can match Claro. Crotch figured and fancy curl stump blanks do have more internal stresses and cross-grain, and they are sometimes weaker or less stable than the straight grained sections. However if the beautiful figure is limited to the buttstock area, up to but not including the grip section, it does not adversely affect the strength or stability of the gunstock. On the other hand, fiddleback is common and just as strong, if not stronger, and probably just as stable as straight grained wood with certainly a more desirable feature in the full length of a blank. Figure 14 displays the Claro in

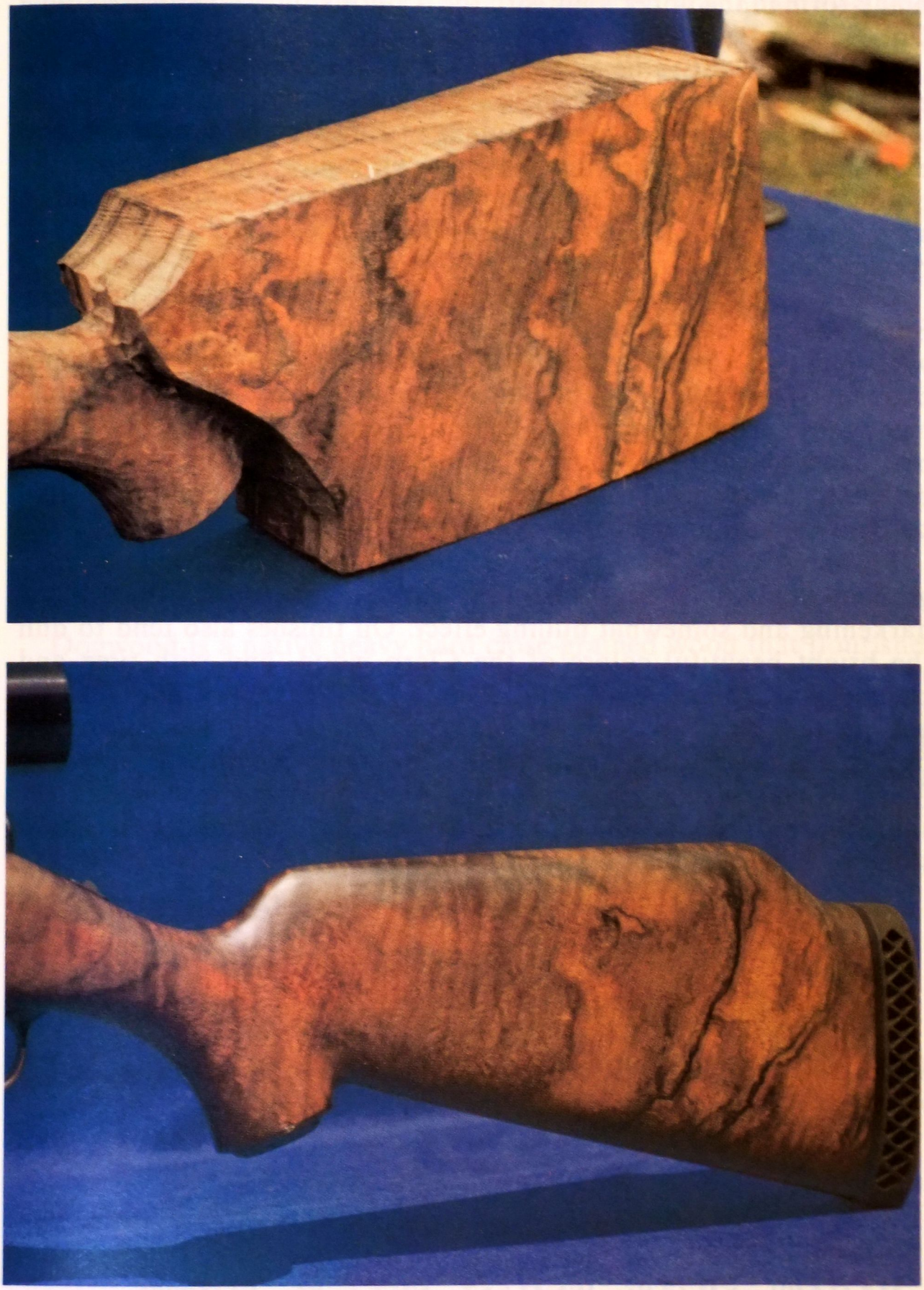


Figure 14. A High-Grade Claro Blank in Raw Form in Top Photo and as a Finished Stock Below

blank form in the upper view with the resulting finished gunstock on a Colt-Sauer rifle in the lower photograph.

Claro turns out to be either the 3rd or 4th choice of wood by the custom stockmakers, being surpassed at least by English and Bastogne walnut. Claro colors have a tendency to dull or fade with age and exposure to light. Trees that have grown rapidly can sometimes be porous and brashy; they may also have a tendency to split instead of slice, and fine line checkering is difficult to accomplish with good results.

Claro is slow to dry and needs about 3 years to air-dry properly. Some operators kiln dry their blanks but caution should be exercised when buying a Claro blank to be sure it has been seasoned in a proper manner. When selecting a blank, pick the heaviest one available, one having the desired figure and color with proper grain flow. This, by the best chance, will be the hardest, the most dense, and it will make a better stock for checkering. It will also give a higher margin of reserve on the recoil requirement.

Finishing Claro in a correct manner is very important as open grained woods tend to absorb large amounts of finish, which has a darkening and somewhat dulling effect. Oil finishes also tend to dull the bright beautiful colors of the Claro wood, and with time and chemical action the stock will develop an aged appearance like an antique furniture piece. If you want to retain the like-new colors, use one of the clear space age varnishes or modern synthetic spray-on finishes that seals the grain pores and simultaneously produces a clear shiny finish. It can be dulled to a lustrous sheen, if desired, with rottenstone or other suitable treatments.

CONGOWOOD

See the African walnut write-up in this chapter.

CUBAN MAHOGANY

Swietenia mahogoni

Hd (1430)—SR (7.9)—Wt 41/.57—VS ( )%—St (1000)

This wood is imported from Cuba, Haiti, Jamaica, and the

Dominican Republic. It is no longer available in large quantities, and is therefore very expensive. Color is light red or yellow tan when cut, but it darkens to a deep rich golden brown or red brown with age. Better woods are highly figured with fiddleback and mottle. This is the heaviest and hardest of all the mahoganies and is an extremely durable, close-grained wood with a fine silky texture.

CYPRESS, BALD

See the bald cypress write-up in this chapter.

DOGWOOD

Cornus florida

Hd 2150—SR (25)—Wt 51/.64—VS 15.7%—St (1000)

Dogwood is a native heavy hard close-grained wood that flourishes in the eastern U.S. from the Mississippi valley east. It is also called row wood and false boxwood. These trees grow to 40 feet in height and 18 inches in diameter with a heartwood that is reddish-brown to dark brown. Of all the American hardwoods, dogwood is one of the native woods having the highest value of resistance to shock or impact ratings.

EASTERN BLACK WALNUT

Juglans nigra

Eastern black walnut is another name for the American black walnut probably applied in the earlier days to distinguish that tree from the California black walnut.

EASTERN RED CEDAR

Juniperus virginiana

Hd 900—SR 8.3—Wt 33/.47—VS 6.2%—St 1140

The eastern red cedar is an American wood, also known as savin and red juniper, probably more appropriately since it is really a juniper instead of a cedar. It has light reddish color and a distinct odor that repels moths and cloth damaging insects.

EAST INDIAN LAUREL

Terminalia tomentosa

This is an imported hardwood from India and Burma; the east Indian laurel is also wrongly called east Indian walnut. It is a coarse-grained, hard, and brittle wood in which pores are large but not numerous. It has a gray to deep chocolate brown color with lighter brown streaks or black lines, much like some of the English walnuts. The figure is occasionally block-mottle or fiddleback with indistinct rays.

EAST INDIAN WALNUT

This is not a true walnut but a misnomer for a wood better known as kokko, which is discussed in Chapter V.

ELM

Ulmus spp.

Twenty species of the genus *Ulmus* are found in the temperate regions of the northern hemisphere. There are six North American species which are subdivided into two groups, hard elms and soft elms.

Hard	Soft
cedar—*U. crassifolia*	American—*U. americana* *
rock—*U. thomasii* *	slippery—*U. rubra* *
September—*U. serotina*	white/grey—*U. americana* *
winged—*U. alata*	

* only elms of significance to the stockmaker

ELM, AMERICAN

See the American elm write-up in this chapter.

ELM, ROCK

See the rock elm write-up later in this chapter.

ELM, SLIPPERY

See the slippery elm write-up in this chapter.

ELM, WHITE/GREY

See the American elm write-up in this chapter.

ENGLISH WALNUT

Juglans regia

Hd 1200—SR 9.8—Wt 40/( )—VS ( )%—St 1320

This very fine stockwood, seldom seen today, is truly a Persian walnut used by famous British gunmakers and is also known as 'Old World' walnut, which differs very little, except for extraordinary color and blank age, from the other *Juglans regia* woods. Many British gunmakers required the blanks to be air-dried 20-30 years before the first cut was made with a tool.

The tree, probably in nut form, was transported to England by legions of the Roman armies when they conquered the islands around 43 A.D. or during their occupation in the next 100 years or so. Stock from these trees and the British nurseries was used to plant the trees in France and Spain and throughout Europe.

Old trees grown on the British Isles supplied those beautiful woods for many years, but now, in spite of their glorious past, most British

gunmakers find it necessary to import their stock woods from America, using American black walnut for the majority of their gunstocks, except for those used on the very highest grades of custom guns. For a more detailed description of this type of wood and its use, see the *Juglans regia* section of this chapter.

EUREKA WALNUT

This is a commercial variety of the English walnut grown in California for edible nut production.

EUROPEAN PEARWOOD

Pyrus communis

The European pearwood is a pale to pinkish-brown wood, which is moderately heavy (48 pcf) and hard with a uniform fine texture. Imported from Europe and western Asia, this wood works easily and takes a smooth finish. Pear dries slowly and has some tendency to warp. It is strong, tough, and difficult to split. See the write-up earlier in this chapter on apple for the other mechanical properties of this wood.

FALSE BOXWOOD

See the dogwood write-up in this chapter.

FIDDLEBACK MAPLE

This is a special figure found in the maple wood having vertical and horizontal grain patterns intersecting at almost right angles. This is a result of an uneven grain structure with very close and abrupt fiber undulations. See the sugar maple write-up for more detail.

FRANQUETTE WALNUT

This is a commercial brand name of the English walnut tree that is grown in California for nut production.

FRENCH WALNUT

Juglans regia

This fine gunstock wood is a descendant of the Persian walnut, brought to France from England, that grows mainly in the Rhone Valley and is now quite rare and difficult to obtain. There are some blanks of French origin that are unique and different from the woods grown in California. The true French variety is usually ligher in color — inclined to be more grayish than other Persian walnuts — and some custom gunmakers, Keith Stegall for example, seldom used anything else. It is hard as domestic English, and some stockmakers say the sawdust odor of this walnut is unique and that it checkers and finishes better.

One, or possibly two, importers are bringing in true pedigreed French blanks, but this wood is not superior enough in quality or grade to justify the price differential. Most French blanks in the American wood trade come mostly from west coast cuttings. Some cutters call the lighter colored California English 'French,' others call all California English 'French walnut'; while another group makes no distinction whatsoever and interchanges the two without any consideration of color. For more details on this wood, see the section entitled *Juglans regia.*

GREEN ASH

Fraxinus pennsylvanica

Hd 1200—SR 13.4—Wt 40/.56—VS ( )%—St 1910

This is a native American hardwood, also known as swamp, river, and water ash. Green ash is the most widely distributed of all the native ashes growing throughout all the eastern U.S. as well as most of the Missouri and Mississippi River drainages. One-hundred-fifty-year-old trees are found, 100 feet high and 3 feet in diameter. This hard, heavy, strong, and stiff wood has high shock resistance capability. Its

heartwood is light brown and this wood is normally marketed as white ash.

GREY ELM

See the American elm write-up earlier in this chapter.

GUM, BLACK

See the black gum write-up earlier in this chapter.

GUM, RED

See the red gum write-up later in this chapter.

GUM, SWEET

See the write-up on sweet gum later in this chapter.

HACKBERRY

Celtis occidentalis

Hd 880—SR 13.5—Wt 37/.43—VS 12.8%—St 1590

This American hardwood is also known, incorrectly, as sugarberry and grows from New England and New York to southeastern North Dakota, south to eastern and central Texas, and northern Arkansas to central Georgia and South Carolina. This tree grows to 130 feet in height and as much as 3 feet in diameter. It is a soft, but a comparatively heavy, wood of a clear light yellow color that will withstand considerable shock. Hackberry resembles ash in many characteristics and takes a good polish.

HARTLEY WALNUT

This variety of domestic English walnut is grown in California for edible nut production.

HEARTNUT
Juglans sieboldiana

The heartnut is a botanical variety, or type, of the Siebold walnut, characterized by a smooth shelled heart-shaped nut. It is believed to be a recessive cross between the original Japanese walnut, *Juglans ailantifolia*, and a Chinese strain of the Persian walnut. Whatever, the tree and wood have little significance to the custom gunsmith or stockmaker.

HEDGEAPPLE

See the osage-orange write-up later in this chapter.

HICKORY, SHAGBARK

See the write-up on shagbark hickory later in this chapter.

HIMALAYAN WALNUT
Juglans regia

This is a Persian, or Asian, walnut gunstock wood imported from Pakistan by Flaig's in the early 1960s. This wood is described as "Himalayan Circassian, was cut from trees 500 to 1000 years old ... 6 to 12 feet in diameter ... extremely dense ... highly figured ... in oversized blanks," according to the advertisement. It probably was from a cutter with a small lot, resulting in a one-time type of buy which is very common in the foreign sources of high-grade wood. See the *Juglans regia* section for more detail of this type of wood and its application.

HINDS WALNUT

Juglans hindsii

Hd (990)—SR (9.0)—Wt 35/( )—VS ( )%—St (1300)

This is the correct technical name for the tree known to the cutter and stockmaker as Claro walnut. It is also called California black walnut, with the three names — Claro, Hinds, and California black —being used interchangeably. Hinds walnut is a tall, single-trunk tree that grows to 80 feet in height and 30-36 inches in diameter, often with a 20 foot bole before the first significant branch. The leaf pattern is typical of the walnuts shown in Figure 7, having a compound leaf 9-12″ long with 15-19 leaflets 2¼ to 4″ long and ¾ to 1″ wide. Fruit of the Hinds is globe-shaped, 1¼ to 2″ in diameter with a thin husk. The 1 to 1¼″ brown black nut is thick-shelled. It is almost smooth, somewhat flattened at one end, with a slight point opposite.

The origin of this tree is shrouded in some mystery. Even though it is a west coast native, its original forest home, and it must have had one, is unknown. Of all the theories to account for the existence of the tree, more are fable than fact. Early settlers found the trees growing in the Indian village sites, thus it is assumed that the Indians, who relished these nuts, had carried the seeds from other places to their village where they were found. Indian legend told of a grove of some 2 dozen trees, later determined to be 26 in all, in the vicinity of Chico, California. One fact of historical record is that the Hinds walnut was discovered and named by the British botanist Richard B. Hinds when he sailed the HMS Sulfur up the Sacramento River in 1847.

Although the original range of the Hinds was very limited, (on the banks of the Sacramento River, near Chico and in Contra County near Walnut Creek, all within 100 miles distance) it has been planted throughout the Sacramento Valley and north to Oregon. Hinds is planted extensively for timber, street and highway ornamental shrubs, and shade trees. This heavy hard wood is valuable as timber and prized as well for stockwood.

Hinds walnut is widely used by the commercial nut plantations as a rootstock material on which the scions of the desired English strain are grafted. Hinds seedlings make good rootstock material because the lower stem and root system is adapted to the local soil and climatic conditions, and they are less susceptible to disease and insect attacks. With the large, deeply penetrating taproot, the grafted tree is more tolerant to dry periods and at the same time has the benefit of disease and pest resistance.

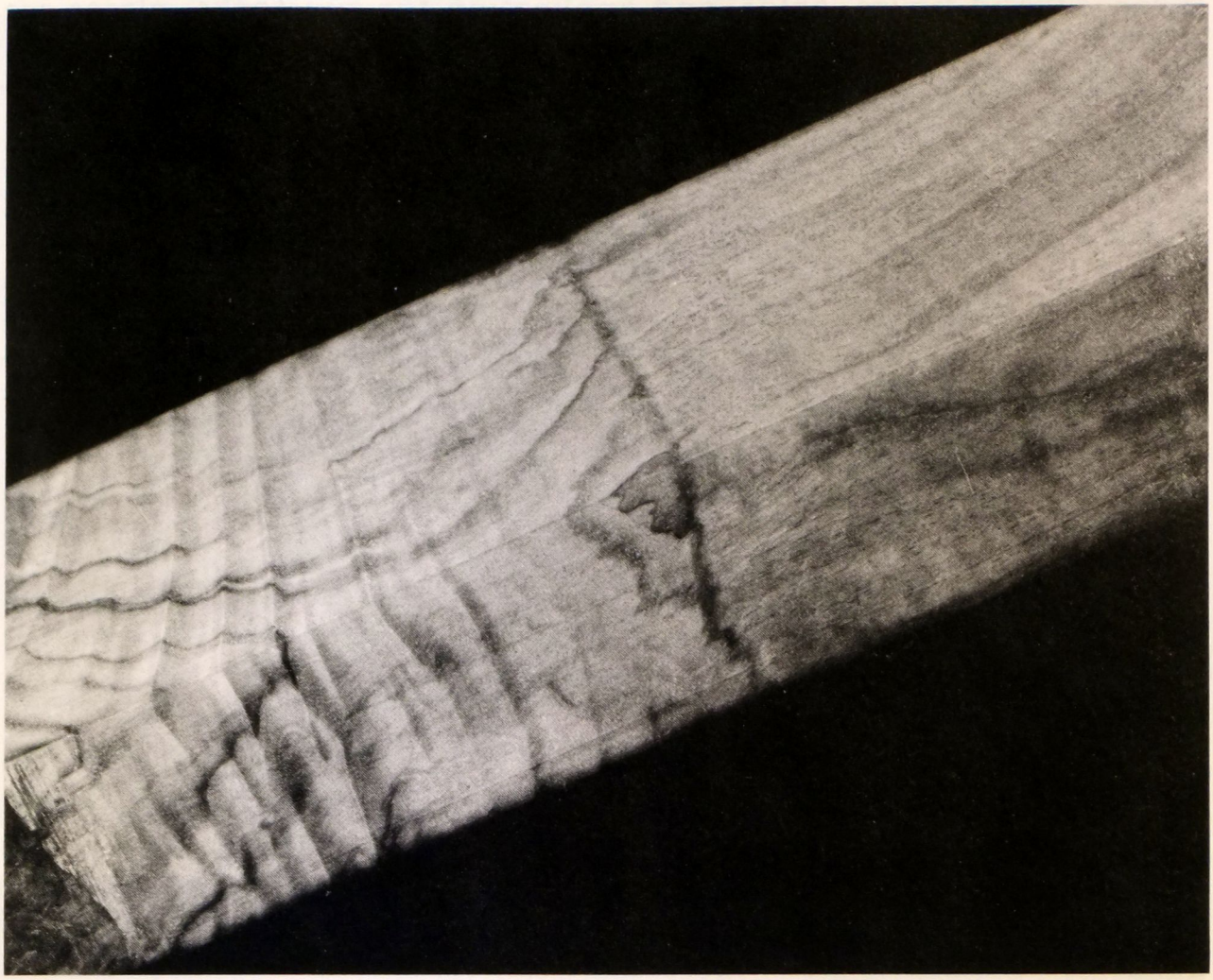


Figure 15. The English/Hinds Graft Line in a Piece of Walnut

Figure 15 is an unretouched photograph of a typical graft union of an English scion (left side) and the Hinds rootstock on the right. So the wood to the right of the well defined junction is Hinds, or Claro if you prefer, while to the left is English walnut wood. Note that even though the edges are smooth and even, the English side appears to have grooves and a wavy surface. This effect is really the result of figure and watermark coloring, typical of the English walnut.

Hinds walnut has been a popular species with the horticulturists for study and development of hybrid trees. The natural cross between Hinds and the English produced a fast-growing tree of beautifully figured wood called Bastogne, a fine wood but a poor nut producer. Luther Burbank later crossed the Hinds with the American black walnut in an experiment to develop a fast-growing, edible nut producing tree that resulted the Royal (hybrid) walnut tree. Royal grows to a large size and produces some fine figured wood of high quality, but it is not famous for nuts. For added detail on the Hinds

(Claro) wood figure, color, and application for gunstocks, please see the Claro walnut section.

HONDURAS MAHOGANY

This wood is discussed under the general topic of tropical American mahogany later in this chapter.

HONEY LOCUST

Gleditsia triacanthos

Hd 1580—SR 13.3—Wt 44/.69—VS 8.6%—St 2250

This hardwood grows mainly in the easten U.S. in all climates where corn or cotton grow, as well as in California. It is also known as the sweetbean tree, and some live to be 120 years old. This light reddish-brown heavy wood is hard, strong, and durable. Honey locust makes beautiful veneer and cabinet woods. With the absence of the predominant medullary rays, characteristic of the oaks, it takes a high polish but the coarse texture requires filling before finishing. The upper photograph of figure 16 shows a high-grade honey locust blank while the lower photograph shows the finished gunstock on a Ruger #1 rifle.

HOP HORNBEAM

Ostrya virginiana

Hd 1860—SR 14.0—Wt 52/.70—VS 15.5%—St 1790

This hardwood is also known as American hophorn and eastern hop. It grows in the eastern U.S. and also in the midwest wheat country. This strong, hard, and tough close-grained wood is quite heavy. The heartwood is light brown, often tinged with red, and it takes a fine polish.

Figure 16. A Honey Locust Blank and the Finished Gunstock on a Ruger #1 Rifle

HORNBEAM

Carpinus caroliniana

Hd 1780—SR (37.1)—Wt 49/.70—VS 15.3%—St 2410

This native hardwood grows throughout the eastern half of the U.S. and is also known as blue buck, water beech, and ironwood. Trees attain heights of 60 feet and have diameters up to 3 feet. This tough, close-grained wood is very hard, heavy, and strong. It is rated high in shock resistance, but the value published in the literature is in doubt since the numerical value is so much greater than hickory; values of twenty-seven or maybe thirty would be more believable. The heartwood is light brown and is seldom cut for lumber or gunstock purposes.

HORSEAPPLE

See the write-up on osage-orange later in this chapter.

IMBERIA

This wood is more commonly called imbuya, which is discussed next in this chapter.

IMBUYA or IMBUIA

Phoebe porosa

Hd 950—SR 7.7—Wt 40/.53—VS 9.0%—St ( )

CAUTION: SAWDUST OF THE IMBUYA WOOD CAN BE PARTICUARLY IRRITATING TO SOME AND CAN CAUSE SNEEZING, DERMATITIS, AND OTHER RELATED REACTIONS.

This wood is imported from Brazil and is also known as imberia, Brazilian walnut, and canella. This tree grows at altitudes of 2000-4000 feet above sea level and trees are 130 feet tall and often 6 feet in

diameter. Imbuya is a beautifully figured wood with a corrugated pattern, being a light brown, almost yellow, to chocolate brown in color resembling American black walnut. It is an open-grained wood with fine texture that may develop honeycomb and collapse in drying. Generally, a filler is required when finishing this wood.

ITALIAN WALNUT
Juglans regia

The Italian walnut is a variety of the Persian walnut that grows on the slopes of Mt. Vesuvius and the nearby Sorrento Peninsula of Italy. This is another of the highly prized stockwoods similar to Circassian in color, figure, and other properties. It is a very, very scarce wood that is worked and finished the same as Circassian walnut. See the section on *Juglans regia* for more information on this wood.

JAPANESE WALNUT
Juglans ailantifolia

A walnut native to Japan, this tree was introduced into the U.S. shortly after 1870 by a nursery in the San Jose valley of California. It is also known as kurmi; some trees are found that are 65 feet high and 30 inches in diameter. This wood is a golden hue instead of the dark brown as normally found in the walnuts. It is too soft and difficult to obtain to be of great importance to the stockmaker.

JUGLANS REGIA

This section recaps all the woods of the *Juglans regia* species known by their common name, usually determined by their locality of growth, and expands the wood characteristics for gunstock application. These names include Asian, California English, Circassian, English, French, Himalayan, Italian, New Zealand, 'Old World,' Persian, and Spanish walnut. This is one of the finest and strongest gunstock woods, highly prized by custom gunsmiths. It is, without question, the KING of all stockwoods. It is dense, possesses the desirable hardness, fineness of texture, radiance of figure, works well with hand and machine tools,

and can be checkered or carved beautifully with great detail. These reasons propel *Juglans regia* to top choice, probably by a 2 to 1 margin, over all other stockwoods by the custom stock and gun makers throughout the world.

Its history dates back to 500 B.C. when the tree, probably in nut form, was brought to Persia from the Far East where, sometime later, it was carried on to Italy. From Italy the Persian nut was taken to England by the conquering Roman armies. From England the tree was spread to France, Spain, and the rest of Europe using the British plant stock. It immigrated to the New World with the early English settlers where it found an ideal home in California in the mid 1800's.

Due to variations in climate, soil conditions, and other factors not totally understood, this wood varies somewhat in character from the different growing localities. Trees grown in each of the geographical areas produce a slightly different type of wood, especially in color and color contrast.

ASIAN and PERSIAN — These names are more historical and apply more to the tree than the wood. While the *Juglans regia* tree was named Persian walnut, even in the U.S. until recent times; it had originated in Asia, the commercial interest in those times were edible nut production and not timber or gunstock blanks. Wood produced from these areas today is marketed as Circassian or some similar name.

CALIFORNIA ENGLISH — This wood by-in-large tends to be somewhat lighter in color than the European *Juglans regia* woods, running from a medium tan to an almost ivory lightness. This gives the dark, at times almost black, watermark of the marblecake clouds more contrast and creates a very striking effect.

CIRCASSIAN and HIMALAYAN — These are dark brown woods with black watermark, often with very tight and narrow bands or streaks, that have a delicate fineness not found in all of the *Juglans regia* woods.

ENGLISH or 'OLD WORLD' — These woods serve as the benchmark for comparison for the woods used in guncrafting of modern times. These woods tend to run a little darker in color with the best blanks glowing with a reddish hue. Considered the very best, with California English a close second, it is so scarce and expensive that even the British gunmakers use it only on their very best, and most expensive, guns.

FRENCH and SPANISH — These are closely akin to the English woods, but they are somewhat grayer in color. The Spanish is usually not considered quite as good as the French by most stockmakers, but it is difficult to tell them apart once they are finished.

ITALIAN — This is a wood of individual character, somewhat like the Circassian and should be finished using the same methods. It tends to have the markings of the Circassian wood but slightly lighter in color.

NEW ZEALAND — This is another wood with individual character. It is most like the English with more of a pinkish hue and more of a wavy hair-like watermark.

Whichever of the geographical names it is called, it is still *Juglans regia* which has traveled a long way through the ages and is prized by the master stockmakers as the finest wood for gunstock making on this Earth.

Juglans regia wood is usally a good rich brown color with fine figuring; it is tough, hard, fine-textured, and fine-grained. It has a high shock rating, making it ideal for many heavy recoil rifles; it is quick and easy to dry with little degradation. Blanks from mature trees come in a fantastic variety of colors and figure and have a rich brown tan background with good watermark. Blanks are found that run from nearly white, through the light browns, oranges, and reds to dark brown with black streaks. On very rare occasions a blank, or tree of blanks, will display a beautiful fiddleback figure. Fiddleback is rare in the *Juglans regia* — a find of this figure is something unusual. The fancier grades have dark, fine lined streaks, and blotches that give a marblized effect with dark shadings. The most prized, most sought after, and most valuable of all the *Juglans regia* blanks are those which have the smoky or 'marblecake' color effect; a figure which probably occurs only once in 100,000 or so blanks harvested. 'Marblecake' has a deeply contrasting smoky effect with dark brown or jet black streaks and clouds overlapping a tawny honey to reddish-amber background. Imagine a combination of the marblecake with full fiddleback figure for a rare, rare blank indeed!

If by some quirk of nature *Juglans regia* had not been honored with its exotic beauty, it would still be the overwhelming favorite wood of the custom stockmaker because of its high machinability rating. It cuts, carves, and checkers beautifully. Everything that makes a piece of

wood good for stockmaking seems to have come together in this species. Close-grained wood is usually a chore to cut with a carving chisel, not so with the *Juglans regia*. Cutting this wood has been compared to slicing cheese, not that it is that soft, but that a sharp tool slices into the wood with a minimum of effort and no splitting or cracking. For example, the stockmaker can take a deep cut with a carving chisel at a sharp angle to the grain direction, going in and out of the wood with little risk of a chip splintering or splitting out. The tight wood grain makes extremely precision inletting possible, since the grain flow has little influence on the direction of chisel cut as happens in other woods. Likewise, the hard dense grain lends strength to the vulnerable corners, such as sharp edges around the close inletting. This allows a better wood-to-metal fit that is sharp and clean with no gaps. Therein lies the secret of super-close fitted inletting as done by the best stockmakers; they use the very best clean cutting woods. This fine gunstock wood is so desirable that even the poorer grades are in constant demand.

The last important working feature of the *Juglans regia* wood is the way it responds to a file or rasp. This becomes quite apparent when you put a rasp to the blank. Even with slight pressure on the rasp the wood seems to dissolve into dust and powder. It doesn't choke up the rasp, and what is caught in the rasp grooves is easy to remove. Sanding of the stock for final finish is a considerably less arduous task than other woods.

Finishing the *Juglans regia* stock is easier than most woods by the manner the natural beauty of the wood is enhanced in the way it accepts a finish. *Juglans regia*, with its fine texture, requires no filling and takes fewer applications of finish to fill the grain pores and obtain a fine smooth surface. Filling should be avoided since some of the delicate figure may be hidden or lost. Most wood is dark enough not to need stain. If the wood is especially light and a darker surface required, darken with brown or reddish stain.

From the viewpoint of the checkerer, *Juglans regia* is a most cooperative wood. Its smooth cutting character makes it possible to bring diamonds up to sharp, clear-cut pyramids and the fine grain permits tinier diamonds than other woods. Thirty-two lines per inch of checkering is common.

A literal translation of *Juglans regia* means 'Royal Walnut' and in the opinion of most professional stockmakers it is just that — a most fitting title — because this is unquestionably the ROYALTY of all gunstock woods.

KOA

Acacia koa

Hd 1110—SR (11)—Wt 37/.54—VS ( )%—St ( )

This hardwood indigenous to Hawaii, also known as Hawaiian mahogany, grows from sea level to top of the volcanic mountains. A fine-textured, open-grained wood with a color that ranges from gold to dark brown with an occasional dark stripe. Fiddleback figure is common, and the best figured wood is found in trees at the higher elevations. When finishing, a filler is suggested to fill the open grain. This open grain makes this wood difficult to checker. A high-grade koa blank is shown in figure 17 with the finished gunstock for a Mauser 98 rifle shown below. Note the fine color and abundant fiddleback figure.

KRUMI

See the Japanese walnut write-up earlier in this chapter.

LARCH, WESTERN

See the western larch write-up later in this chapter.

LAUAN, RED

See the red lauan write-up in this chapter.

LAUAN, WHITE

See the white lauan write-up in this chapter.

LITTLE WALNUT

This is better known as Texas walnut, which is described later in this chapter.

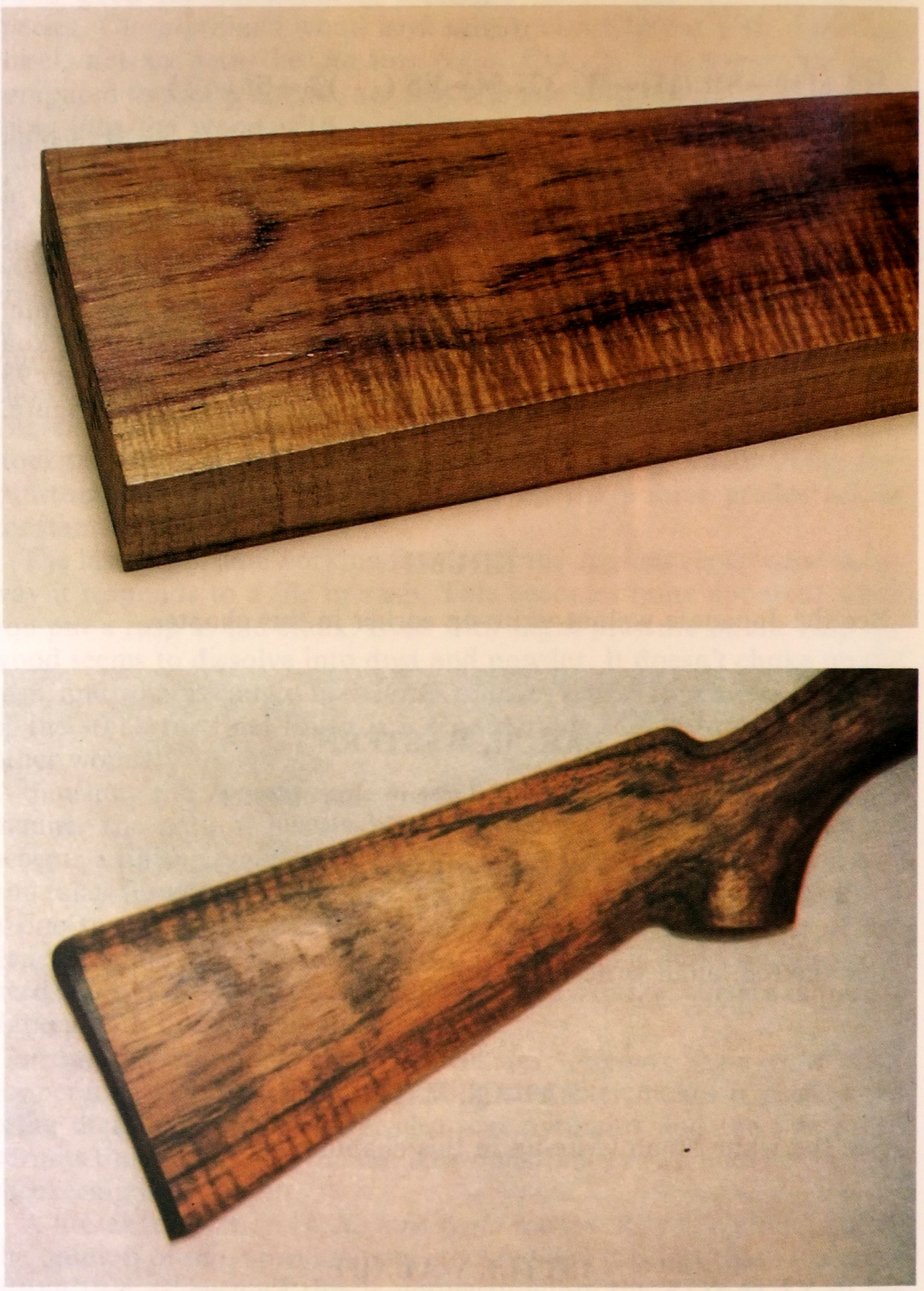


Figure 17. A Koa Blank and the Finished Gunstock for a Mauser 98 Rifle

LIVE OAK

Quercus virginiana

Hd ( )—SR 18.9—Wt 60/.88—VS ( )%—St 2660

This is an evergreen hardwood native to the Gulf Coast, most of Texas, Florida, and the eastern seaboard. It is also known as Virginia live oak. This is one of the white oaks; it grows to be 60 feet tall with a trunk diameter up to 7 feet. It grows with a large crown, often three times the height. The yellowish-brown hard tough wood is heavy, strong, and takes a fine polish even though it is a coarse-grained wood.

LOCUST, BLACK

See the black locust write-up earlier in this chapter.

LOCUST, HONEY

See the honey locust write-up earlier in this chapter.

LONGLEAF PINE

Pinus palustris

Hd 875—SR 11.8—Wt 38/.59—VS ( )%—St 1510

This native American coniferous evergreen is the largest, most distinctive, and most important of all the southern pines. Commonly called southern pine, this tall stately tree of the coastal plain grows in the poorer acidic soils from southeastern Virginia to central Florida and westward to eastern Texas. These trees are slow in growing with the young plants spending most of the early years in development of a long strong taproot. Needles of the leaf are 10 to 15 inches long with seed cones growing to a length of 10 inches. This light red to reddish-orange wood is strong, heavy, tough, and hard for pine and is the hardest and heaviest of the pines. This wood varies widely in grain and texture depending on the growing conditions. It is not a good

candidate for gunstock use due to the light color and coarse open grain.

LOVOA

This is a misnamed, false walnut better known as African walnut, which is described earlier in this chapter.

MADRONE

Arbutus menziesii

Hd 1460—SR 8.8—Wt 44/.66—VS 14.5%—St 1810

This is a native west coast hardwood which has evergreen leaves. These trees grow to 125 feet in height and 7 feet in diameter; some live to be 225 years old. This hard, heavy, and moderately strong wood is fine-textured with very small pores. The heartwood is light reddish-brown to pale brown and when seasoned properly, this wood makes a good gunstock material. The madrone also produces beautiful burls that command a premium price by the wood carvers.

MAGNOLIA, SOUTHERN

See the southern magnolia write-up for more information.

MAHOGANY

Khaya or Swietenia spp.

Scores of different species of pale reddish-brown to dark red tropical hardwoods have been sold as mahogany lumber. The only woods that can legitimately be called mahogany are the two genera, *Swietenia* from Central and South America and the *Khaya* from Africa. Many other species, having at one time or another been described as mahogany, belong to various other genera which, from a botanical

point of view, are not even closely related to the true mahoganies.

Swietenia mahogani, which is imported from the West Indies, is also known as Spanish mahogany since it is also imported from Cuba, Puerto Rico, and San Domingo. *Swietenia macrophylla* is imported from Central and South America. The principal exporting regions are Mexico, Honduras, and Brazil. A true mahogany from Venezuela, *Swietenia candollei*, is said to resemble Cuban mahogany and is often differentiated from the *Swietenia macrophylla* group in commerce.

There are many species of *Khaya*, two of these provide most of the African commerce in mahogany. The most important of these imported into the U.S. are *Khaya ivorensis* and *Khaya anthotheca*, both called African mahogany in the trade. *Khaya ivorensis* grows in the rain forests of coastal West Africa while *Khaya anthotheca* grows in the less humid areas of West Africa. Other species occur in central and east Africa; most important of these are *Khaya grandifolia* and *Khaya senegalensis*, also known as African mahogany, whose growth extends from the drier regions of West Africa to Uganada and Tanzania.

Similar timbers, misnamed mahogany, belong to the genera *Shorea, Parashorea,* and *Pentacme* and are marketed in southeast Asia as dark red and light red meranti and in the Philippines as red and white lauan. The latter two are often sold as Philippine mahogany also.

See the following for more information on the specific species of interest.

True mahoganies	Misnamed mahoganies
African	*Brazilian mahogany
Cuban	*dark red meranti
Honduras	*light red meranti
Mexican	Philippine mahogany
Peruvian	red lauan
Tropical American	white lauan
Venezuelan	

*Discussed in Chapter V

MANCHURIAN WALNUT

Juglans mandshurica

A true walnut, with a wood similar to butternut, that grows in Korea

and other close-by regions. It is a straight-grained wood generally milder in color and figure than the other walnuts. Trees are too small and scarce to be of great commercial importance.

MANSONIA

Mansonia altissima

CAUTION: MANSONIA DUST CAN CAUSE SNEEZING AND WATERING OF THE EYES.

This hardwood, imported from West Africa, which is also incorrectly called African black walnut, is a straight-grained purplish-brown wood having a medium to fine texture. It is generally harder than the American black walnut, but the other characteristics are very nearly equivalent. This is a plentiful wood with a reasonable price range, it has the potential of making good gunstock material.

MAPLE

Acer spp.

Over 100 species of the maple genus is distributed throughout the northern hemisphere. Several North American species are marketed as either hard of soft maple.

Hard Group	Soft Group
black—*A. nigrum*	bigleaf—*A. macrophyllum*
rock—*A. saccharum*	California—*A. macrophyllum*
sugar—*A. saccharum*	Oregon—*A. macrophyllum*
	Pacific—*A. macrophyllum*
	red—*A. rubrum*
	silver—*A. saccharinum*
	western—*A. macrophyllum*

For more information on a specific species see the listings of bigleaf, black, red, silver, or sugar maple in this chapter.

MAPLE, BIGLEAF

See the write-up on bigleaf maple earlier in this chapter.

MAPLE, BLACK

See the black maple write-up earlier in this chapter.

MAPLE, CALIFORNIA

Another name for the bigleaf maple; see the bigleaf write-up earlier in this chapter.

MAPLE, PACIFIC

Another name for the bigleaf maple; see that write-up earlier in this chapter.

MAPLE, ROCK

Another name for the sugar maple; see that write-up later in this chapter.

MAPLE, SILVER

See the silver maple write-up later in this chapter.

MAPLE, SUGAR

See the sugar maple write-up later in this chapter.

MAPLE, WESTERN

Another name for the bigleaf maple; see that write-up earlier in this chapter.

MAYETTE WALNUT

Juglans regia

This variety (brand name) of English walnut was grafted by the Frenchman named Mayette from which it gets its name. It was developed in France during George Washington's time and it is presently grown in California for edible nut production.

MESQUITE

See specific type; honey or screwbean later in this chapter or curly in Chapter V.

MEXICAN MAHOGANY

See the write-up under tropical American mahogany later in this chapter.

MONTANA LARCH

Another name for the western larch; see that write-up later in this chapter.

MOUNTAIN LARCH

Another name for the western larch; see that write-up later in this chapter.

MYRTLE

Umbellularia californica

HD 1270—SR 8.2—Wt 39/.56—VS 9.9%—St 1860

CAUTION: CRUSHED GREEN FOLIAGE, WHEN INHALED, IS PURPORTED TO CAUSE SEVERE HEADACHES WHICH ARE DIFFICULT TO CURE.

This is a hardwood, with evergreen leaves that produces a hard strong wood, also known as acacia burl, California olive, Oregon myrtle, Pacific myrtle, pepperwood, spice tree, California laurel, and mountain laurel. These trees are found only in a small area of northern California and western Oregon, especially around Coos Bay, Oregon. This tree grows to 120 feet in height and 6 feet in diameter. Myrtle takes an excellent polish and once had a reputation of being unstable and difficult to season. However, with proper care in drying this wood, it has become a very useful and popular gunstock wood. The heartwood has an interlocked grain with a wide variety of colors and a special type of figure. The most beautiful woods for varied types of figure and coloring are found in the Oregon trees. This wood has a wide range of color from light to dark shades, and there is a mixture of plain wood, fiddleback, mottle, cluster burl, and bird's-eye figure. This wood is commonly a rich golden brown and yellowish-green in color. Some wood is very dark and this is called 'black myrtle.' This beautiful effect is reported to be produced, or at least enhanced, by the lumberman sinking the heavier-than-water green unseasoned logs in a freshwater stream until they are sap-free and seasoned. Myrtle produces a feather crotch and burl figure with a scattering of dark purple pigmentation blotches which are quite valuable and very desirable.

Myrtle has become popular with many of the American custom stockmakers since World War II, especially those who cater to the ladies' side of the sport because it has such variety in color and figure. Combinations of these are almost unlimited and one can be found to please almost any taste. Figure 18 shows a one-piece rifle blank of dark myrtle and the finished stock on high-grade rifle. Figure 19 shows a completed T/C carbine shoulder stock of light feather crotch myrtle. Myrtle is light in weight, strong, and takes a finish that is unbelievable; it checkers well and makes an outstanding stock in color and figure. The biggest drawback to use of this wood is the difficulty in working the fancy-figured pieces with common hand tools.

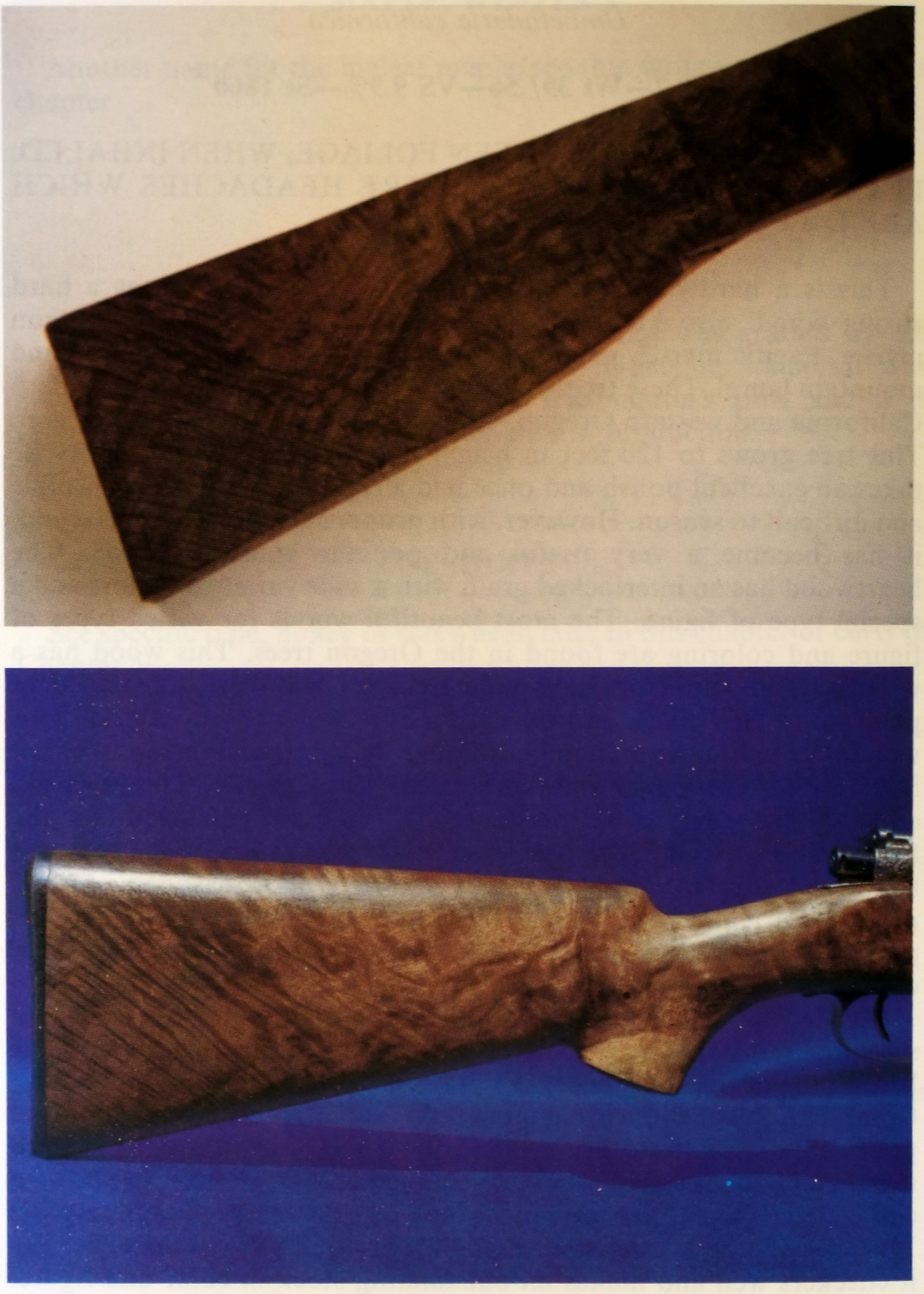


Figure 18. A Myrtle Blank and the Resulting Finished Stock on a Mauser Model 98 Rifle

Figure 19. A Light Colored Myrtle Stock on a T/C Carbine

NEW GUINEA WALNUT
Dracontomelum mangiferum

A misnamed, false walnut from southeast Asia which is also known as Pacific walnut and papuan walnut. The figure of these woods resemble true walnuts, but it is much less dense.

NEW SOUTH WALES WALNUT
Endiandra virens

This is another misnamed walnut that is native to Australia.

NEW ZEALAND WALNUT
Juglans regia

A true English walnut that is grown in New Zealand having the

general wood characteristics of the English but quite different in coloring. This wood color varies widely with figure, but it is best described as a combination of the English and Claro walnuts. It has the black streaked watermark and marblecake figure like the English and a pinkish-ocher color like the Claro is common. Imagine a fine English blank with considerably more of a pink background than the light tan background found in the domestic English. Supply of this gunstock wood is scarce, and only a few blank cutters (1 or possibly 2) are operating in New Zealand. Their output is very limited. Prices for the good grades are high — probably higher than the supply warrants — but that is the case in all high-grade woods.

NOGAL (WALNUT)

Juglans ???

Hd ( )—SR ( )—Wt 38/.50—VS 8.5%—St ( )

This is a true walnut found on the eastern slopes of the Andes and in Central America. These trees grow to be 60 feet in height and 3 feet in diameter. Also known as tropical walnut, it is probably related to the Peruvian walnut. The wood is generally chocolate brown, darker than the American black walnut with lighter colored streaks and sometimes with a purplish cast. This is a straight-grained, rather coarse-textured wood that is difficult to dry. The thicker planks are especially prone to collapse and honeycomb. Tension and compression failures are frequently observed after seasoning.

NORTHERN CATALPA

Catalpa speciosa

Hd 550—SR 9.6—Wt 26/.40—VS 5.8%—St 1130

The name 'catalpa' comes from the Cherokee Indian. This tree is indigenous to a very limited region near the junction of the Ohio River with the Mississippi. Its original area of growth was a narrow band along the Ohio from southwestern Indiana and southeastern Illinois to west Tennessee, southeast Missouri, and northeast Arkansas. It is also known as hardy cat, cigar tree, and catawba tree. These trees grow to

be 80 feet in height and 3 feet in diameter. Being the larger of the two native catalpas, it is most likely to be available as lumber. The soft, not strong, grayish-brown wood may occur tinged with lavender. This coarse-grained wood needs to be filled when finishing.

NUGGET WALNUT

This is a specific variety of domestic English walnut that is grown for the edible nuts.

OAK

Quercus spp.

Over 200 species of the genus *Quercus* grow world-wide; most of these grow in the northern hemisphere. There are four groups of these trees, two of which may be of interest to the stockmaker and American woodworker.

1—white oaks
2—red oaks
3—evergreen oaks
4—non oaks (mostly eucalyptus)

There are ten species of each of the red and white oaks that are found in North American, but only two of these are considered important to the stockmaker. See the specific species of interest for more information.

live oak (white)
post oak (white)
scarlet oak (red)
water oak (red)

OLD WORLD WALNUT

Juglans regia

This name is applied to the English and Persian walnuts grown in Europe. See the section on the English walnut and *Juglans regia* for more information.

OREGON BLACK WALNUT

Juglans nigra

This is an American black walnut grown in Oregon and Washington. Select cuts are much harder than common American black, and some custom stockmakers insist on this wood wherever black walnut is specified. This walnut checkers well and dense specimens work better than the ordinary. See the section on the American black walnut for further details.

OREGON ENGLISH WALNUT

Juglans regia

This English walnut is grown in Oregon and it is almost identical to the California English walnut.

OREGON MAPLE

See the section on the bigleaf maple earlier in this chapter.

OREGON MYRTLE

See the write-up on myrtle earlier in this chapter.

ORIENTALWOOD

Endiandra palmerstonii

Hd (1480)—SR (10)—Wt 42/.55—VS 13%—St ( )

This is a hardwood imported from Australia that is also known as Australian laurel, Australian walnut, and Queensland walnut. Large trees are found in heights of 140 feet and 6 feet in diameter. It is a firm to hard wood somewhat like English walnut, except for darker color and more frequent fiddleback figure. The color of this wood is typically

a gray to medium brown with dark watermarks. The texture and weight are comparable to walnut allowing the use of the same finishing methods. This wood has a high silica content, but glues satisfactorily when used for furniture or veneer.

OSAGE-ORANGE

Maclura pomifera

Hd 2500—SR (30)—Wt 55/.76—VS 7.4%—St 3300

This is an exceedingly hard, strong, and heavy wood that grows throughout the middle of the U.S.; it is called Bois-d'arc, horseapple, and hedgeapple. These trees grow to 50 feet in height and 3 or more feet in diameter. This tree produces a bright yellow gold to golden-brown orange wood, with an occasional brown streak throughout. This close-grained, fine-textured resilient wood polishes to a high luster. Osage-orange is a good stockwood if the weight and color presents no problem and a suitable size of blank can be found.

PACIFIC MAPLE

See the bigleaf maple write-up earlier in this chapter.

PACIFIC MYRTLE

See the write-up on myrtle earlier in this chapter.

PACIFIC WALNUT

This is a misnamed, false walnut from the South Pacific; it is better known as New Guinea walnut which is discussed earlier in this chapter.

PACIFIC YEW

Taxus brevifolia

Hd 1150—SR 20.2—Wt 43/.64—VS 7.8%—St 1620

This is a slow growing evergreen hardwood, also called western yew, that grows in a narrow band on the northwest coast from northern California to Alaska, with a small area of growth inland in eastern Washington and northern Idaho. It grows, for the most part, along mountain streams and attains a height of 75 feet and a diameter of 3 feet or more. Yew trees of this size are 150 to 250 years old and some of the larger specimens are believed to be over 300 years of age. This fine-grained wood is very heavy, hard, and strong in bending. The heartwood is a clear rose red which becomes duller when exposed to light. This fine-textured wood is often highly figured. Yew has been used for canoe paddles, archery bows, and small cabinet work, but its scarcity prevents wide commercial usage.

PAPUAN WALNUT

This is a misnamed, false walnut from southeast Asia, that is better known as New Guinea walnut, which is discussed earlier in this chapter.

'PARADOX' WALNUT

This walnut is better known to the stockmaker as Bastogne, the French equivalent of bastard. It is a natural hybrid cross between the California English, *Juglans regia*, and the Claro, *Juglans hindsii*, walnut and was named 'PARADOX' by Luther Burbank. A few stockmakers prefer, and properly, the original nomenclature of Paradox and continue to use it today.

PAYNE WALNUT

This is a specific variety of the English walnut that is grown in California.

PEARWOOD, EUROPEAN

See the European pearwood write-up earlier in this chapter.

PECAN

Carya illinoensis

Note: Some texts show this genus as *Hicoria.*

Hd 1820—SR 13.8—Wt 48/.66—VS 10.9%—St 2080

This is a native hardwood of the hickory group. Not as hard as hickory, but it is a hard, elastic, and strong wood that steam bends easily. The heartwood is pale reddish-brown with a rare piece having darker streaks of watermark as found in English walnut.

PEPPERIDGE

See the black gum write-up earlier in this chapter.

PEPPERWOOD

See the write-up on myrtle earlier in this chapter.

PERSIAN WALNUT

Juglans regia

This is the true name of the original nut tree, known to the cutter and stockmaker as English or California English walnut, and widely known as Asian walnut, where the names are used almost interchangeably. There are more than 40 species of walnut of the genus *Juglans*, native to various parts of the world. Asian, or Persian, is the

first to appear in recorded history, somewhere around 500 B.C. Some walnut history 'buffs' like to give Marco Polo credit for bringing the nut back to Italy from the Far East; but he lived in a much later time frame (1254-1324 A.D.) and could not have performed this good deed. A more correct account, that fits a proper time in history, seems to indicate that armies of Darius and Xerxes (two Greeks) carried the nuts from the Far East (possibly western China) around 500 B.C. to the Ancient Empire of Persia, which is now Iran. Alexander The Great (356-323 B.C.), another Greek, and his armies further spread this valued edible nut to the eastern Mediterranean Sea area and most likely on to Italy.

Later the armies of Rome marched, conquered and planted their favorite food, and the tree ended up in England sometime after the Romans conquered England in 43 A.D. From England the tree was spread to France, Spain, and the rest of Europe using the British plant stock. From England the tree was also introduced into the new world and eventually found a suitable and happy home in California in the 1800s.

Evidence bears out this Far East origin since many huge old trees of the *Juglans regia* species are found in the Vale of Kashmir, southwestern China in the Province of Yunnan, and the Himalayan Mountains area of Pakistan. Known by many other trade names as well, Circassian and Himalayan seem to be the modern day counterpart of these famous nut/wood trees. For more detail and application to gunstock use, see the *Juglans regia* section.

PERSIMMON

Diospyros virginiana

Hd 2300—SR 15.4—Wt 53/.72—VS 15.4%—St 2160

This native American tree is a white ebony, even though it belongs to the genus *Diospyros* that produces so many of the familiar black ebonies. The persimmon grows throughout a wide area of the U.S. where light sandy soil is found, especially in southern Ohio, Missouri, Kansas, and Texas. The narrow heartwood is light yellow to a dark brownish-black, sometimes almost black. The sapwood is white with a greyish tint, often with black streaks; and it may be as many as 60 annual rings thick in older trees. This pale colored sapwood attracts the greatest commercial interest. This normally straight-grained,

Figure 20. A Sample of Persimmon Showing the Typical Color and Texture

Figure 21. A Slab of Pistachio Cut for Knife Scales

strong, tough, and fine-textured wood takes a high polish and is the favorite wood of manufacturers of golf club heads. A sample of persimmon is shown in figure 20. The color and texture demonstrate why it is called white ebony. Persimmon shrinks considerably during the drying cycle and may exhibit substantial movement under changing moisture conditions in use.

PERUVIAN MAHOGANY

See the tropical American mahogany write-up later in this chapter.

PERUVIAN WALNUT

Juglans neotropica

This walnut is native to Peru which grows in the high mountain valleys. These trees grow to be 60 feet tall and 3 feet in diameter and grow at elevations as high as 8000 feet, which makes them almost impossible to harvest. Once the trees are cut, they must be transported over the Andean range to Calendin on the Pacific Coast for export. This fine wood is almost equivalent to American black walnut in color, figure, and grain structure, but it is slightly lighter in weight and coarser in texture.

PHILIPPINE MAHOGANY

This false, misnamed mahogany is better known as red lauan, which is described later in this chapter.

PISTACHIO

Pistacia vera

This is a nut tree, native to south central Asia, which grows well in California, especially in the upper Sacramento and San Joaquin Valleys. It grows best in sandy soil and prefers a hot dry climate. These

trees grow to 30 feet in height and a few gunstock blanks have been harvested from the larger trees. The heartwood is heavy and hard, having a light tan color and usually straight-grained. Figure 21 shows a piece of pistachio cut for knife scales.

POPLAR, YELLOW

See the yellow poplar write-up later in this chapter.

POST OAK

Quercus stellata

Hd 1360—SR 13.2—Wt 47/.67—VS ( )%—St 780

This native American white oak, also known as iron oak, grows over a wide area of the eastern and southern U.S., west to mid-Texas and north to Missouri and Illinois. It grows in poor, dry, sandy, or gravely soil as well as the moist areas of the Mississippi Valley. In the south Appalachian Mountains it grows at elevations of 2500 feet, but the largest trees, with the best quality of lumber, are found in the Mississippi Valley. Big trees, 100 feet in height and 3 feet in diameter, are not uncommon. Wood of the stump, crotch areas, and burls is dense, hard, and fine-textured. It is light in color, with unusual figure and grain structure. It is not widely cut for lumber, but finds some use in railroad ties and construction timbers.

QUEENSLAND WALNUT

This is not a true walnut, but another name for orientalwood, which is described earlier in this chapter.

QUILTED MAPLE

This is a special figure found in the bigleaf maple. Figure 22 shows an

Figure 22. A Flame Maple Blank with Quilted Figure and the Finished Gunstock for a Mauser 98 Rifle

unfinished and finished rifle stock made from a high grade blank with the quilted figure. See the bigleaf maple earlier in this chapter for more information on this wood.

RED CEDAR, EASTERN

See the eastern red cedar write-up earlier in this chapter.

RED GUM

See the sweet gum write-up later in this chapter.

RED JUNIPER

See the eastern red cedar write-up earlier in this chapter.

RED LAUAN

Shorea negrosensis

Hd 825—SR (9.4)—Wt 42/.55—VS 13.3%—St ( )

This is a hardwood imported from the Philippines, incorrectly called and marketed as Philippine mahogany, that has a uniform texture and moderately prominent pores. These trees grow to 200 feet in height and 6 feet in diameter. A common figure is the ribbon stripe, with an interlocking grain. The heartwood runs from a light red to a dark brownish-red and can have some unusual patterns when the board is highly figured. This wood glues well, takes a good finish, but needs to be filled before finishing with conventional finishes.

RED OAK

See the scarlet oak write-up later in this chapter.

REDWOOD

Sequoia sempervirens

Hd 480—SR 6.9—Wt 24/.40—VS 5.4%—St 940

This is a native west coast evergreen that grows to great heights and girth. Tree heights of 350 feet are not uncommon with trees living to a nominal age of 500 years. The heartwood is light cherry to a reddish-brown, and burls are highly prized for their figure and color patterns. Redwood is a fine-textured wood that is strong for its relative weight.

RIVER WALNUT

See the Texas walnut write-up later in this chapter.

ROCK ELM

Ulmus thomasii

Hd 860—SR 16.9—Wt 44/.57—VS 11.0%—St 1630

Rock elm is a heavy hardwood, also called cork elm, found throughout the mid-north U.S. These trees grow to reach heights of 80 feet and diameters of 3 feet. It is stronger, harder, and stiffer than any of the other commercially timbered elms. Rock elm has a high shock resistance; it is somewhat difficult to work, and has excellent bending qualities. The rock elm heartwood is brown to dark brown, sometimes with shades of red, and is the finest of all the elm woods.

ROCK MAPLE

See the sugar maple write-up later in this chapter.

ROSE WALNUT

Endiandra discolor

This is not a true walnut, but a misnamed wood from Australia that resembles walnut in color and figure.

ROSEWOOD

Dalbergia latifolia

Hd 1450—SR 13.1—Wt 53/.70—VS (small)%—St 2090

There are many species of rosewood throughout the world (see the rosewood, *Dalbergia spp.*, section in Chapter V) that have captured the imagination of woodworkers for hundreds of years for building the finest pieces of furniture, cabinets, and pianos. In recent years since World War II, the custom stockmaker has utilized rosewood to supply a market hungry for unique and different stockwoods. With the advent of the modern artistic stock styles, having exotic pistol grips and high cheekpiece shapes, more and more demands have been put on the wood vendor to supply new woods.

These have been mostly exotic imported woods, and East Indian rosewood is one that has proven desirable and suitable for the purpose. It was probably selected due to both its availability and light weight (53 pcf). This is the lightest of the common rosewoods in weight, but it is still heavier than Bastogne walnut. It is a strong, hard, dense, and highly stable wood that has very little shrinkage in drying and exhibits minimum movement in service.

The heartwood color runs from golden brown to dark purplish-brown with darker, near black, streaks. It is varied in color, and the natural pigment distribution results in an attractively figured wood that checkers well and holds a sharp crest. A rich expensive looking wood that often prompts the remark, "It looks like money." This is a wood with high stability, having a classic rare natural beauty in a gunstock wood, that withstands harsh climatic hunting and shooting conditions. Figure 23 shows a rosewood blank in the raw, followed by the finished stock installed on the gun.

ROW WOOD

See the section in this chapter on dogwood.

ROYAL (HYBRID) WALNUT

Juglans hindsii + Juglans nigra

This walnut, often classed with the California English group, is a

Figure 23. A Rosewood Blank at the Top and the Finished Stock Installed on Gun

hybrid developed by Luther Burbank in an experiment to propogate a faster growing and earlier producing nut tree. It is a cross between the Hinds walnut, *Juglans hindsii*, and the American black walnut, *Juglans nigra*. Some literature shows this species, incorrectly, as a cross between the *Juglans regia* and the *Juglans nigra*.

The resulting tree is usually a poor nut producer, but it produces an excellent gunstock wood. It is very much like Bastogne in character and color, a very scarce wood, but not enough superior to the other walnuts to be of great significance to the stockmaker.

SASSAFRAS

Sassafras albidum

Hd 630—SR 8.7—Wt 32/.45—VS 8.2%—St 1240

This is a light, soft, and brittle wood, also known as cinnamon wood, that grows throughout the U.S. from Missouri east. The larger trees are found in Missouri and Arkansas and grow to be 100 feet in height with diameters of 4 feet or more. This coarse-grained wood has a dark tan, tinged with red, heartwood that is commonly used in furniture and cabinet work.

SAVIN

See the eastern red cedar write-up earlier in this chapter.

SCARLET OAK

Quercus coccina

Hd 1400—SR 20.5—Wt 47/.67—VS ( )%—St 1890

This is an attractive hardwood of the red oak group common in the eastern U.S. It occurs on upland sites, in all kinds of soil, and trees grow to 100 feet tall and 3½ feet in diameter. This is a rapid growing tree often found at elevations of 2600-4000 feet and has been found thriving at 5750 feet.

The hardness of all the red oaks are all about the same; scarlet oak was selected over the other reds for discussion because of its high value of SR, which is 20.5. The heartwood is a pinkish to reddish-brown, heavy, hard, strong, and coarse-grained. This wood is generally inferior to the white oaks. It is marketed as oak lumber and is sold with the other red oaks.

SCREWBEAN MESQUITE

Prosopis pubescens

Hd 2335—SR (4.7)—Wt 54/.85—VS 4.5%—St 1400

Mesquite trees grow mainly in the desert southwest from Texas to California. These trees are small, reaching only about 20 feet high by 12 inches in diameter. The heartwood color is a rich milk chocolate with a slight reddish cast. Grain is straight to wavy, with some blanks having a wild figure. Screwbean mesquite is a very practical and strong wood which offers a more bold type of stock with unique beauty and its contrasting light and dark color patterns. Some gunmakers have used this wood on rifles in the past. Semi-finished stocks are available from a variety of sources, one of which is R. Fajen in Warsaw, Mo.

Mesquite contains substantial silica, making it difficult to work and tools are dulled rapidly. Hardness of this wood allows clean-cut checkering, even though it is hard on the checkering tools. The mesquite tree does not grow big, so it is not uncommon to find a blank, that is one-of-two, cut from the same tree, one having been cut on each side of the tree pith center. This gives a quarter sawed grain pattern on one side and a slab sawed surface on the other side. These blanks commonly require repair to fill hidden cavities and small internal defects uncovered in final stock shaping. These are still structurally sound stocks, that carve and checker nicely and the repair often adds to the figure, as a beauty mark adds to a pretty lady's appearance. Honey mesquite, *Prosopis glandulosa*, is another mesquite available for gunstock use. Except for slight differences in color and some grain structures, these two are about equal. Good honey mesquite blanks may often be more readily available than the screwbean variety.

SHAGBARK HICKORY

Carya ovata

Note: Some older publications show this genus as *Hicoria*, but *Carya*

seems to be preferred as shown in more recent documents.

Hd (1820)—SR 25.8—Wt 63/.72—VS 13.4%—St 2340

This is a true American hardwood, which is also known as Carolina, scalybark, and upland hickory. Shagbark hickory wood is very heavy, strong, stiff, and exceedingly high in shock resistance, having one of the highest ratings of all the American hardwoods. These trees are found throughout the eastern U.S. and grow to 90 feet tall and greater than 2 feet in diameter. Hickory grows very slowly and many trees are 200 years old. The heartwood is brown to reddish-brown and is usually less than 30% of the total tree diameter.

SHELL-FLAME MAPLE

This is a specific figure and grain structure found in the maples. See the section on the bigleaf maple earlier in this chapter.

SIEBOLD WALNUT

This is a close relative of the butternut; it once had the status of an independent species and its own botanical name. Older literature shows it as *Juglans sieboldiana*, but more recent publications show it as a variety of the Japanese walnut, which is described earlier in this chapter.

SILVER MAPLE

Acer saccharinum

Hd 700—SR 8.3—Wt 34/.47—VS ( )%—St 1480

This is a hardwood, of the soft maple group, which is also known as silverleaf maple and river maple. It grows over most of the eastern U.S., except for the coastal areas, and west to Missouri, Iowa, Minnesota, and northern Arkansas. The best trees are found in the Ohio basin. These trees grow to be 125 feet high and 4 feet in diameter.

The wood is hard, heavy, but not too strong and has a light brown heartwood that takes a high polish and finishes well without filling.

SLIPPERY ELM

Ulmus rubra

Hd 860—SR 16.9—Wt 43/.53—VS 11.0%—St 1630

This is a native American hardwood, of the soft elm group, indigenous to the eastern U.S. It is also known as red elm and soft elm. These trees grow to be 135 feet tall and 4 feet in diameter. This hard, strong, and compact wood is reddish-brown and useful as paneling, crates, and furniture. Except for the low value of hardness, that could affect the ability to do fineline checkering, its mechanical properties suggest it may be suitable for gunstock wood if blanks of satisfactory size, color, and figure can be obtained.

SOUR GUM

See the black gum write-up earlier in this chapter.

SOURWOOD

Oxydendrum arboreum

Hd 940—SR (8)—Wt 38/( )—VS 12.1%—St ( )

This native American hardwood, of the southeastern U.S., grows to 60 feet in height and is also known as arrow-wood, elk tree, lily-of-the-valley tree, sorrel gum, and titi tree. This very close-grained wood is hard, heavy, and difficult to work with tools. Its heartwood is reddish-brown to pale light brown, and it has the potential for use as a gunstock wood provided an ample supply of timber of suitable blank size can be found.

SOUTH AMERICAN WALNUT

See the write-ups on Nogal (walnut) and Peruvian walnuts in this chapter.

SOUTHERN CALIFORNIA WALNUT

Juglans californica

Most newer literature now shows this as the preferred name for the tree once called California black walnut, or just California walnut. This revised nomenclature helps to avoid past confusion on this tree with the Hinds, Claro, or California black walnut that grows in the northern part of the state. This tree is indigenous to the coastal areas from Santa Barbara south to Orange County. This native tree is a round crowned, shrubby, and spreading plant having a typical compound leaf as shown in figure 7. Total length is 6-9″ with 11-15 leaflets ½-¾″ wide and 1 to 2½″ long. The fruit is small, about ¾″ in diameter, globe-shaped with a thin husk. The brown thin-shelled nut is smaller than any other of the native American walnuts; it is near round, flattened at the base, with a few shallow longitudinal grooves.

Since the tree forks very near the ground into several trunks, it is normally not suited for lumber, but it has produced some fine burls, at and below ground level, for carving and veneer. It is now planted mostly for shade and ornamental purposes.

SOUTHERN MAGNOLIA

Magnolia grandiflora

Hd 1020—SR 12.8—Wt 35/.50—VS ( )%—St 1530

The magnolia is an evergreen tree common in the southeastern U.S., which is also known as evergreen, bull bay, and great flowered magnolia. These trees grow to be 80 feet high and 4 feet in diameter. Wood is harder than poplar, close-grained, with very fine and uniform texture, and having above average shock resistance. The heartwood is light to dark brown, with shadings of yellow or green on occasion. Magnolia has low shrinkage when being dried and could be useful in making laminated stocks where a contrast is desired in the wood color

pattern. This wood will make a satisfactory stock, if one is willing to settle for a light color and no figure or little grain coloration. This wood requires no filling when finishing.

SOUTHERN PINE

See the write-up on the longleaf pine earlier in ths chapter.

SPANISH WALNUT

Juglans regia

This is an off-shoot of the Persian walnuts that were carried to Europe, by-way-of-England, in the early days of planting. This wood resembles French walnut and it is difficult to determine the difference when the stock is finished, but most custom stockmakers prefer the real French.

SPICE TREE

See the write-up on myrtle earlier in this chapter.

SUGAR MAPLE

Acer saccharum

Hd 1450—SR 16.5—Wt 44/.63—VS 11.9%—St 2330

Sugar maple is a heavy, strong, and stiff hardwood of the hard maple group which is also known as hard maple and rock maple. It grows throughout the U.S., with trees as tall as 130 feet and having diameters up to 3 feet. It is a very fine-textured, extremely close-grained wood with high resistance to shock, but it is somewhat difficult to work since it is so hard.

The color of the sugar maple wood is light, almost white, with a reddish-brown heartwood and in rare cases greenish-black streaks are found near injuries. Varied grain/color patterns are found. Among these are curly, bird's-eye, tigertail, fiddleback, and basket weave fiddleback along with a beautiful swirl in the stump and crotch areas.

Sugar maple not only produces maple syrup, it is a strong and stable gunstock wood. The strongest and hardest woods are found in northern Michigan, while western Pennsylvania produces the best curly and fiddleback blanks. But of all the figure possibilities in maple, the bird's-eye figure makes one of the most beautiful, strongest, and hardest gunstock woods.

Maple will take a very smooth finish; it takes stain well, but this is not suggested or recommended. This wood checkers very well and some of the most outstanding figure displays are developed by enhancing the grain/color pattern with a flame treatment.

SWAMP WALNUT

See the black willow write-up earlier in this chapter.

SWEET GUM

Liquidambar styraciflua

Hd 850—SR 11.9—Wt 37/.52—VS 12%—St 1600

This hardwood, a member of the witch-hazel family, is also known as alligator tree, red gum, blistered gum, and alligator wood. It grows throughout all of the southeastern U.S.; these trees prefer rich moist soils and grow to 150 feet in height and 5 feet in diameter. It is a moderately heavy wood with high resistance to shock. It also ranks above average in steam-bending properties. The heartwood is reddish-brown and occasionally pieces are found with variegated streaks of a darker color. A filler is not required when finishing since this fine-textured hardwood is so close-grained.

SYCAMORE

Plantanus occidentalis

Hd 770—SR 8.5—Wt 35/.49—VS 11.4%—St 1470

Figure 24. A Piece of Sycamore in Blank Form at the Top and as a Finished Gunstock Below

This is a hardwood found in the U.S. from the Mississippi River eastward. It is really the American plane tree, but it has been called 'sycamore' for so long, it would be next to impossible to revise this common name at this date. This tree is also known as button-ball, button wood, and water beech. These trees grow to 170 feet in height and 14 feet in diameter.

Sycamore can be a very satisfactory gunstock wood if it is selected from the heavier, stronger grades, and properly seasoned. It has an interlocked grain structure which helps prevent splitting and gives a dainty, very attractive lacewood type of figure. It is a light brown to a reddish-brown in color and should be left natural because staining does not allow a satisfactory finish. Pores are small on the denser blanks, but still the best finish results when a film type of spray-on material is used. With coarse grain, coarse-textured blanks, it is recommended that the recoil lug areas be reinforced for use on rifles having heavier recoil than the 30-06 round. For some strange reason sycamore woods do not checker well and, at best, must be of coarse large-diamond, such as 18 lines per inch. In the upper photo of figure 24 a sycamore blank is displayed, while the lower picture is the completed gunstock for a Mauser 98 rifle.

TAMARACK

Larix laricina

Hd 590—SR 7.1—Wt 39/.53—VS 10.9%—St 1280

This is a North American conifer also known as American, eastern, black, and Alaskan larch and hackmatack. Trees of 100 feet in height and 2 feet in diameter grow in the northern U.S. and southern Canada. This wood has a light brown heartwood and is heavier and stronger than most conifers.

TANOAK

Lithocarpus densiflorus

Hd 1400—SR 17.9—Wt 48/.66—VS ( )%—St 2180

This wood grows in northern California and southern Oregon and is

also known as tanbark oak. It is not a real oak, but an intermediate genus between the chestnuts and oaks. This tree grows to 100 feet in height and 5 feet in diameter, with some trees reaching the age of 350 years. The heartwood is light brown, faintly tinted with red. This is a very hard, heavy, and strong fine-grained wood that has some potential for use as utility gunstock blanks.

TEXAS WALNUT

Juglans microcarpa

Note: This species is shown in early publications as *Juglans rupestis.*

Hd (1010)—SR (10.7)—Wt (38/.55)—VS (10.2)%—St (1370)

This scarce walnut is found in small scattered areas through southwestern Kansas, western Oklahoma, Texas to New Mexico, Arizona, and north central Mexico. Until recent times the Texas walnut was shown in the literature as *Juglans rupestris*, and its most common name was given as little walnut. It was believed to produce the smallest nut of the native walnuts, but it is now known that the Southern California walnut produces the smaller nut, and the botanical literature has been updated to reflect these facts and to comply with the predefined rules of scientific names. This is a tall single trunk tree that grows along the stream beds, in the valleys, and rocky ravines. These trees reach 50 feet in height and 30 inches in diameter and seem to thrive on full sun. Young trees develop a large taproot to help withstand dry years. The leaf configuration is typical of that shown in figure 7, having an overall length of 8-14″ with 9-17 leaflets, 3½-7″ long and ½ to 1¼″ wide. Fruit of the Texas walnut is 1 to 1½″ in diameter, global-shaped, and dark brown at maturity. The thick-shelled nut is almost round, slightly flattened at the base, brown to black in color, with deep lengthwise, slightly forked ridges. This wood, even though very suitable from the standpoint of hardness, color, and figure, is so limited in supply that its use as a gunstock wood is generally impractical.

TIGERTAIL MAPLE

This is a special type of figure, more often called fiddleback, found

in the hard maples. See the sugar maple write-up earlier in this chapter.

TIGERWOOD

This wood is better known in the U.S. as African walnut. See that write-up at the beginning of this chapter.

TROPICAL AMERICAN MAHOGANY

Swietenia macrophylla

Hd 810—SR 7.9—Wt 32/.45—VS 5.7%—St 1290

This true mahogany timber is imported from Brazil, Central America, Mexico, and Peru, and is also known as Honduras, Mexican, Venezuelan, and Peruvian mahogany. This high density, medium hardwood has high resistance to decay, a pleasing figure, only slight shrinkage in drying, and is relatively easy to work with tools. Its color varies from a light reddish or yellowish-brown to a rich dark red, depending on the area of origin, and it becomes darker when exposed to light in the unfinished state. Wood is fairly open grained and requires filling when finishing to obtain a high polish.

TROPICAL WALNUT

See the nogal (walnut) write-up earlier in this chapter.

WAHOO

See the write-up on cascara earlier in this chapter.

WALNUT

Juglans spp.

There are about 50 species of the genus *Juglans* scattered throughout the world. Seven of these are found in the U.S. proper. Like

mahogany, the name walnut has been given to many woods which have no botanical relationship with the valuable and prized genuine walnut timbers of the genus *Juglans*. Many are, in general, high quality woods showing at least some desirable characteristics of the true walnuts. But the intrinsic beauty and inherent strength of walnut makes good substitutes difficult to find. For more information on the true walnuts of the *Juglans* genera, see the following:

American black
Arizona
Asian
Bastogne
black
California black
California English
Carpathian
Chinese
Circassian
Claro
Eastern black
English
French
Himalayan
Hinds
Italian
Japanese
little
Manchurian
Mayette
New Zealand
Old World
Oregon black
Oregon English
Paradox
Persian
river
Royal (hybrid)
Siebold
South American
Southern California
Spanish
Texas
tropical
white

Of the false or misnamed walnuts two are North American woods. One is sweet gum, or red gum, *Liquidambar styraciflua*; it has a pleasant light walnut color with irregular darker streaks. The heartwood of the black willow, *Salix nigra*, is the other, and is sometimes known as swamp walnut. See the write-ups on these in this chapter if more information is desired.

The only commercially available South American false walnut of significance is a wood known as Brazilian walnut, or imbuya, *Phoebe porosa*. This is a walnut-like timber, but not of the genus *Juglans*.

From Africa comes an imported timber called African walnut, *Lovoa trichilioides*, which is a fine quality wood, but a member of the mahogany group. African walnut is known in America as tigerwood, Congowood, or lovoa, and it is often miscalled benin. Another African wood, called African black walnut, or mansonia, *Mansonia altissima*, is found in international trade.

A number of species of two Australian genera, *Endiandra* and *Beilschmiedia*, have a resemblance to walnut in texture and color. Queensland walnut, *E. palmerstonii*, bears the closest likeness. Other species are New South Wales walnut, *E. virens*, rose walnut, *E. discolor*, yellow walnut, *B. bancroftii*, and blush walnut, *B. obtusifolia*.

There is a misnamed southeast Pacific walnut, known variously as New Guinea, Pacific, or papuan walnut which comes from various species of the genus *Dracontomelum*, and especially *D. mangiferum*. The figure of this wood resembles walnut, but it is less dense. A species of the same genus *D. dao*, having the local name of paldao, occurs in southeast Asia and the southwest Pacific region.

An East Indian false walnut, known as kokko, *Albizia lebbek*, is a leguminous species. It is coarser in texture than walnut and its irregular, interlocked grain gives it the appearance intermediate between that of walnut and iroko, but it is rare to find this wood in commerce. For more on the false misnamed walnuts see the following:

African black walnut
African walnut
benin mahogany
blush walnut
Brazilian walnut
Congowood
East Indian walnut
imbuya
*kokko
lovoa
mansonia
New South Wales walnut
Pacific walnut
*paldao
papuan
Queensland walnut
rose walnut
swamp walnut
tigerwood
yellow walnut

*See Chapter V

WATER OAK

Quercus nigra

Hd 1190—SR 21.5—Wt 44/.63—VS ( )%—St 2020

This native American hardwood is found in the gulf states and the lower eastern seaboard; it is also known as possom oak and spotted oak. It is one of the red oaks, with trees growing to 80 feet high and 42 inches in diameter. It is a heavy, hard, stiff, and strong timber with a high shock rating. The heartwood is light brown to reddish-brown color. This close-grained oak is often cut and sold as red oak.

WESTERN LARCH

Larix occidentalis

Hd 830—SR 12.6—Wt 37/.55—VS 10.6%—St 1410

A deciduous evergreen, which is also known as Montana and mountain larch, and western tamarack, that grows in the western U.S. Some of these trees are very old, at least 400 years, with many 250 years of age. This wood grows only in a small area in the northwest. It is hard and fine-grained with a reddish-brown heartwood.

WESTERN MAPLE

See the write-up on bigleaf maple earlier in this chapter.

WESTERN TAMARACK

See the western larch write-up above.

WHITE ASH

Fraxinus americana

Hd 1320—SR 17.6—Wt 42/.60—VS 10.7%—St 1950

White ash grows throughout the eastern half of the U.S. and is also called Baltimore and smallseed white ash. This is the largest and most valuable of the native U.S. ashes. White ash trees reach 150 feet in height with trunk diameters of 6 feet. It is a very strong, tough, and elastic wood that holds up well under shock. This hard, close-grained wood is excellent for bending and is used for tool handles, cabinetry, and baseball bats. The heartwood is light brown, sometimes with a reddish tint. This ash, though well qualified, is not a highly desired gunstock wood since there are so many others available with better color, figure, and grain structure.

WHITE ELM

See the American elm write-up earlier in this chapter.

WHITE LAUAN

Pentacme contorta

Hd 690—SR (7.9)—Wt 36/.43—VS 8.7%—St ( )

This hardwood is imported from the Philippines and harvested from trees that grow to be 120 feet tall and 6 feet in diameter. It is a medium heavy wood with cross-interlocked grain and having coarse texture. The heartwood is light to grayish-brown to light reddish-brown and may have a pinkish tinge.

WHITE OAK

Quercus alba

Hd 1360—SR 14.8—Wt 46/.69—VS 12.6%—St 2000

White oak is a heavy, very hard wood which is also known as forkleaf white oak, ridge white oak, and stave oak. White oak grows in the eastern half of the U.S. and prefers a rich, well drained soil. These trees attain the greatest size in valleys of western slopes of the Allegheny Mountains and bottom lands of the lower Ohio basin, some reaching 150 feet in height and 8 feet in diameter. The heartwood is grayish-brown and can be finished to show pretty figure.

WHITE WALNUT

This is another name for butternut; see that write-up earlier in this chapter.

WILD CHERRY

This wood is better known as black cherry, which is described earlier in this chapter.

WITCH HAZEL

Hamanamelis virginiana

Hd 1530—SR 15.0—Wt 43/( )—VS ( )%—St ( )

This native hardwood is found in the eastern U.S. and grows to only 30 feet in height and a diameter of 12 inches, with the greater sized trees being found in the Appalachian Mountains. This hard, heavy, and close-grained wood has a light brown heartwood, but the trees are so small that commercial lumbering for gunstock woods is not economical.

YELLOW BIRCH

Betula alleghaniensis

Hd 1260—SR 20.8—Wt 43/.55—VS 13.4%—St 1880

This heavy native hardwood is also known as silver birch and swamp birch. This wood is strong and stiff and has a high shock rating. Yellow birch is harder and stronger than American black walnut, but it has high shrinkage and must be seasoned carefully to prevent checking and warping. This light reddish-brown wood grows mainly in the northeast U.S. in trees 80 feet high and 2 feet or more in diameter. On a par with walnut, birch has been approved as a suitable alternate gunstock wood for weapons of the armed services. Now and then a blank with good figure is found, but usually there is no appreciable beauty in the natural wood. Hard blanks checker nicely, but the softer woods 'fuzz-up' under the checkering tool. No filling is necessary when finishing, since this wood is so fine textured.

YELLOW BUCKEYE

Aesculus octandra

Hd 350—SR 5.9—Wt 25/.36—VS 10.0%—St 960

This native hardwood is also known as sweet and large buckeye. Trees 90 feet high and 3 feet in diameter are found mixed in with other hardwoods in a small area of south Ohio, Indiana, southwest Pennsylvania, western Virginia, Kentucky, Tennessee, and western

North Carolina. The best trees grow in the fertile soils of the Tennessee and North Carolina mountains. Wood of the yellow buckeye is uniform in texture, generally straight-grained, weak, soft, and has low resistance to shock. Its heartwood is creamy white to yellowish-white.

YELLOW POPLAR

Liriodendron tulipifera

Hd 540—SR 8.8—Wt 26/.40—VS ( )%—St ( )

This is a moderately lightweight deciduous tree of the tulip genus *Liriodendron* (not even related to the poplar) and is also known as canary wood, canoe wood, tuliptree, and whitewood. Common in the eastern U.S., the largest trees are found in the Ohio River Valley and the southern Appalachian Mountains. Trees grow to 120 feet tall and up to 6 feet in diameter. Classed as a moderately soft wood, it is low in bending and compression strength and has limited resistance to shock. This heartwood is light yellow to dark brown with a definite greenish cast and occasionally with a rather dark streak. This wood has a fairly fine texture and needs no filler when finishing.

YELLOW WALNUT

Beilschmiedia bancroftii

This is a minor, misnamed false walnut from Australia.

YEW, PACIFIC

See the write-up under Pacific yew in this chapter.

ALPHABETICAL LISTING OF GUNSTOCK WOODS

	Hard.	Shock Rating	Weight	Volume Shrink.	Strength
African mahogany	1350	(6.4)	46/.60	7%	(950)
African walnut	940	(6.6)	34/.45	5.4%	( )
Almond	( )	(18)	42/( )	( )%	( )
American black walnut	1010	10.7	38/.55	10.2%	1370
American chestnut	540	6.5	30/.43	9.3%	1080
American elm	830	13.0	34/.50	11.7%	1510
Apple	1730	23.0	46/.74	14.7%	1740
Aspen	350	7.6	27/.38	9.3%	850
Bald cypress	510	8.2	28/.46	8.4%	1000
Basswood	410	7.2	26/.37	( )%	990
Bastogne walnut	1460	(12.3)	42/( )	( )%	( )
Beech	1300	15.1	45/.64	13%	2010
Bigleaf maple	850	7.8	34/.48	( )%	1730
Black ash	850	14.9	35/.49	( )%	1570
Black cherry	950	11.4	33/.50	9.2%	1700
Black locust	1700	18.4	48/.69	8.2%	2480
Black maple	850	12.5	43/.57	( )%	1820
Black oak	1400	13.8	45/.61	( )%	1900
Black willow	(420)	8.8	26/.34	( )%	1250
Butternut	490	8.2	27/.38	8.5%	1170
Cascara	1040	6.1	36/( )	( )%	( )
Claro walnut	(990)	9.0	35/( )	( )%	1300
Cuban mahogany	(1430)	(7.9)	41/.57	( )%	(1000)
Dogwood	2150	(25)	51/.64	15.7%	(1000)
Eastern red cedar	900	8.3	33/.47	6.2%	1140
English walnut	1200	9.8	40/( )	( )%	1320
Green ash	1200	13.4	40/.56	( )%	1910
Hackberry	880	13.5	37/.43	12.8%	1590
Honey locust	1580	13.3	44/.69	8.6%	2250
Hop hornbeam	1860	14.0	52/.70	15.5%	1790
Hornbeam	1780	(37.1)	49/.70	15.3%	2410
Imbuya	950	7.7	40/.53	9.0%	( )
Koa	1110	(11)	37/.54	( )%	( )
Live oak	( )	18.9	60/.88	( )%	2660
Longleaf pine	875	11.8	38/.59	( )%	470
Madrone	1460	8.8	44/.66	14.5%	1810
Myrtle	1270	8.2	39/.56	9.9%	1860

ALPHABETICAL LISTING OF GUNSTOCK WOODS (Cont.)

	Hard.	Shock Rating	Weight	Volume Shrink.	Strength
Northern catalpa	550	9.6	26/.40	5.8%	1130
Orientalwood	(1480)	(10)	42/.55	13%	( )
Osage-orange	2500	(30)	55/.76	7.4%	3300
Pacific yew	1150	20.2	43/.64	7.8%	1620
Pecan	1820	13.8	48/.66	10.9%	2080
Persimmon	2300	15.4	53/.72	15.4%	2160
Post oak	1360	13.2	47/.67	( )%	780
Red lauan	825	(9.4)	42/.55	13.3%	( )
Redwood	480	6.9	24/.40	5.4%	940
Rock elm	860	16.9	44/.57	11.0%	1630
Rosewood	1450	13.1	53/.70	(small)	2090
Sassafras	630	8.7	32/.45	8.2%	1240
Scarlet oak	1400	20.5	47/.67	( )%	1890
Screwbean mesquite	2335	(4.7)	54/.85	4.5%	1400
Shagbark hickory	(1820)	25.8	63/.72	13.4%	2340
Silver maple	700	8.3	34/.47	( )%	1480
Slippery elm	860	16.9	43/.53	11.0%	1630
Sourwood	940	(8)	38/( )	12.1%	( )
Southern magnolia	1020	12.8	35/.50	( )%	1530
Sugar maple	1450	16.5	44/.63	11.9%	2330
Sweet gum	850	11.9	37/.52	12%	1600
Sycamore	770	8.5	35/.49	11.4%	1470
Tamarack	590	7.1	39/.53	10.9%	1280
Tanoak	1400	17.9	48/.66	( )%	2180
Tropical American mah.	845	8.5	32/.45	5.7%	1330
Water oak	1190	21.5	44/.63	( )%	2020
Western larch	830	12.6	37/.55	10.6%	1410
White ash	1320	17.6	42/.60	10.7%	1950
White lauan	690	(7.9)	36/.43	8.7%	( )
White oak	1360	14.8	46/.69	12.6%	2000
Witch hazel	1530	15.0	43/( )	( )%	( )
Yellow birch	1260	20.8	43/.55	13.4%	1880
Yellow buckeye	350	5.9	25/.36	10.0%	960
Yellow poplar	540	8.8	26/.40	( )%	( )

DECORATOR MATERIALS

A few words are in order to introduce the write-ups that follow in this chapter. Most materials discussed are imported, and a certain number of duplications from the stockwoods chapter will be found. These timbers, mostly imported or exotic, are found in forests throughout the world. These materials are the primary items for decorative usage on gunstocks as forearm tips, grip caps, buttplates, trigger guards, and inlays. Leather, steel, and plastic are not listed, even though they are often used for these same purposes, since their origin or use is either well known or not of special interest.

Latin names are again used for the same reasons mentioned in the introduction to stockwoods. There is probably a greater risk that more of these names are in conflict than the earlier names, since most of these entries are applied to foreign woods. Precautions again are given where applicable and known. Weight data is given for many of the woods, in pounds per cubic-foot (pcf) and other mechanical data where available and useful.

Included below is a table that can be used as a guide to assist in selection of decorator wood to mate with the various gunstock woods. This is only intended as a guide and the individual has the prerogative of making any combination desired to obtain the preferred contrast in color.

DECORATOR	COLOR	STOCK
Amaranth	Purple	All
Angico	Red brown	All
Cocobolo	Brill. red orange	All
Ebony	Black or striped	All
English wal. (fancy)	Dark brn./blk. lines	All
Holly	White	Dark & walnuts
Maple (bird's-eye)	White	Dark Woods
Osage-orange	Yellow gold	All
Padauk	Rusty golden red	Wal. & maple
Redwood (burl)	Reddish-pink	Maple & myrtle
Rosewood (Brazilian)	Dark brown	All
Walnut (fancy figure)	Dark brn./blk.	Light woods

DECORATOR	COLOR	STOCK
Zebrawood	Lt. yellow/blk. lines	Walnuts
Ziricote	Streaked black/brown	All

* * *

ACAPU
Vouacapoua americana

This is a coarse-textured wood imported from Brazil and Central America, and is sometimes called brownhart. The heartwood is dark chocolate brown, and the grain is usually straight to slightly roey.

AFRICAN BLACKWOOD
Dalbergia melanoxylon

This is a dark purplish to jet black wood with black streaks; it is a hardwood of the rosewood genus imported from East and South Africa. It is a very hard, as well as heavy (82 pcf), wood with a fine texture that finishes exceptionally well. This wood, a good substitute for ebony, checkers clean and beautifully when made into pistol grips.

AFRICAN EBONY
Diospyros crassiflora

CAUTION: SAWDUST MAY CAUSE DERMATITIS.

African ebony is one of the black ebonies, also called Nigerian ebony; it is a jet black wood, quite hard and heavy (63 pcf), imported from Gabon and equatorial Africa. This wood is darker and harder than the other ebonies. It is a very fine-textured wood that takes a high polish; a popular wood for use as forearm tips and grip caps.

AFRICAN PADAUK

Pterocarpus soyauxii

This bright orange red wood, with dark stripes, is imported from West Africa. It is a heavy (45 pcf), medium-textured wood, with interlocked-grain, that takes a lustrous finish.

AFRORMOSIA

Percopsis elata

This hardwood is mostly imported from the Ivory Coast and Ghana, with small amounts shipped from Zaire. This yellowish-brown wood is cut from huge trees, 130 feet tall and 3½ feet in diameter, and resembles teak. It is about the same weight (40 pcf), but normally finer in texture. It often has an interlocked grain giving a stripe figure. It is very stable after it is dry, and it takes a fine finish.

AFZELIA

Afzelia bipindensis

This is a tree from tropical Africa, mainly Cameroon and Nigeria. These trees grow to 100 feet in height and 40 inches in diameter. A distinctive straight-grained wood with a rich mahogany red color. It is a coarse-textured, dense, high strength, wood that is heavier than oak. It drys slowly and shrinks little in the process. Once dry it is stable and has many uses, since it is resistant to acid.

ALDER, RED

See the red alder write-up later in this chapter.

AMARANTH

Peltogyne densiflora

Hd 2760—SR 20.0—Wt 58/.67—VS 9.9%—St 2210

Imported from Mexico and South America and related to purpleheart, this violet purple wood is hard, heavy, and fine-textured. It takes a glossy lustrous oil finish and is often found with a curly figure. This wood checkers nearly as well as the rosewoods.

AMAZON ROSEWOOD

Dalbergia spruceana

This true rosewood is imported from Brazil. It has a texture and figure resembling East Indian rosewood, but different in color. The color is generally a golden brown with reddish-purple stripes.

ANDAMAN PADAUK

Pterocarpus dalbergioides

This valuable wood, imported from the Bay of Bengal's Andaman Islands, has a rich crimson hue or shades of red to brown, often with darker red or black streaks; it is related to the rosewoods. It is also known as vermillion and maintains its color well.

ANDIROBA

Carapa guianensis

This is a moderately hard wood that is imported from the West Indies, Central America, and Brazil. It has a hardness, strength, and texture similar to the American black walnut. This wood is better known as crabwood in the timber trade. See the crabwood write-up later in this text for more information.

ANGELIQUE

Dicorynia guianensis

Hd 1290—SR 11.2—Wt 45/( )—VS 11.2%—St 1660

This hard medium-textured wood is imported from Brazil. The

heartwood is a dark brown with a purplish cast and it can, under the right circumstances, be a substitute for American black walnut.

ANGICO

Piptadenia rigida

This is a reddish-brown wood with a purplish cast and black stripes. Imported from Brazil, it is a hard, heavy (65 pcf), fine-textured wood that takes a smooth high polish.

APITONG

Dipterocarpus grandiflorus

This hardwood, imported from the Philippine Islands, is sometimes misnamed Philippine mahogany. Its color varies from light to dark reddish-brown or brown to dark brown, sometimes with a purplish tinge. Its grain is often slightly crossed or shallowly interlocked. This wood has a moderate to coarse texture and is hard, comparatively heavy (47 pcf), and often difficult to glue. A natural resin may interfere with obtaining a good finish.

AUSTRALIAN BLACK BEAN

Castanospermum australe

This coarse-textured valuable wood is imported from the eastern Queensland area of Australia. It is a brown wood, deepening to a near black, with lighter shaded streaks. Often highly figured, it is moderately hard and heavy as well as strong and stiff. It works well and takes a good polish.

AUSTRALIAN BLACKWOOD

Acacia melanoxylon

Although called blackwood, this golden to chocolate brown wood

with a reddish cast and dark brown stripes, is imported from southeastern Australia and Tasmania. This moderately hard and heavy (45 pcf) wood, with medium to fine texture, is generally straight-grained, but sometimes has wavy grain and fiddleback figure. It takes a smooth lustrous finish and is used for gunstocks, piano parts, and fine furniture.

AUSTRALIAN CHERRY

Exocarpus cupressiformia

This is a hard and durable pinkish fruit wood found in Australia.

AUSTRALIAN ROSEWOOD

Heterodendron oleaefolium

This is a misnamed wood from Australia having some general characteristics of the rosewoods.

AVODRIE

Turraeanthus africanus

CAUTION: SAWDUST IS KNOWN TO CAUSE DERMATITIS AND NOSEBLEED WITH CONSTANT EXPOSURE.

Hd 1080—SR 9.4—Wt 36/.51—VS ( )%—St 2040

This wood has a color of creamy white to a pale yellow darkening to a golden yellow. Its texture is moderately fine; grain is straight, wavy or irregularly interlocked with high natural luster. This wood glues well and has an attractive mottle figure when quarter sawed. Imported from West Africa, this wood is hard, medium weight (36 pcf) and needs to be filled when finishing.

BEEFWOOD

Manilkara bidentata

This reddish-brown to plum red wood is imported from Central and

South America. This wood is hard, heavy (58 pcf) and takes a fine polish. Its most common uses are for violin bows and pool cues.

BIRD'S-EYE MAPLE

See the sugar maple write-up in Chapter IV.

BLACK PALM

Astrocaryum standleyanum

This is a product of Panama, which is the outer part of the palm trunk consisting of numerous fine black fibers. The end grain gives the effect of lizard or snake skin. It is quite heavy (65 pcf) and is capable of a high polish.

BLACK POISONWOOD

Metopium brownei

This is a variegated cocoa brown or reddish-brown wood with high golden luster. Hard and somewhat heavy (53 pcf) with fine texture, this wood is imported from Mexico and Belize.

BLACKWOOD

There are many woods that have the generic name of 'blackwood'. Four of these, prominent in international timber trade, are the following:

1. African blackwood, *Dalbergia melanoxylon*, grows in tropical Africa.
2. Australian blackwood, *Acacia melanoxylon*, is imported from Australia.
3. Indian blackwood, *Dalbergia latifolia*, is grown in India and is better known as East Indian rosewood.
4. South African blackwood, *Royena lucida*, is imported from South Africa.

See the specific one of interest as listed elsewhere in this chapter.

BLOODWOOD

Brosimum paraense

This is a rich strawberry red wood that sometimes has golden stripes. Imported from Brazil, it is hard, heavy (60 pcf), and takes a high lustrous finish.

BOCOTE

Cordia elaegnoides

Imported from Mexico and Central America, this strong, hard, and heavy (55 pcf) wood is also called cordia, Mayan rosewood, and Mexican rosewood. Even though it is not a true rosewood, this wood has a beautiful yellow to gold background filled with dark brown streaks and occasional 'eyes'. It is very dense and oily, and must be sealed to retain its natural color and brilliance. The figure of this wood can be a flowered heart to a striped grain pattern. A highly colored piece of this valuable wood is shown in figure 25.

Figure 25. A Piece of Highly Figured Bocote

BOIRE

Detarium senegalese

Imported from Africa, this is a brown to reddish-brown wood that has a contrasty grain. Its figure is wild and looks like contrasty English walnut, and it makes a good walnut substitute.

BOLIVIAN ROSEWOOD

Dalbergia nigra

This is a brownish hardwood with pink or purple grain coloration. It is the same tree, botanically, as the Brazilian rosewood.

BORNEO EBONY

Diospyros durianoides

One of the many striped or streaked ebonies, this is a wood with a jet-black background laced with tan or gold colored streaks throughout. This fine-textured wood takes a fine polish, as do all the ebonies.

BRAZILIAN LAURO

Cordia trichotoma

This greenish-brown to reddish-brown wood, with irregular dark brown to blackish streaks, is imported from Brazil. It is a relative of bocote, but not normally as highly figured. It is hard and heavy (55 pcf) with a medium fine texture that finishes smoothly.

BRAZILIAN MAHOGANY

Cariniana legalis

This wood is similar in color and appearance to the tropical mahoganies, but it is not even related to the genus *Swietena*.

Figure 26. Samples of Brazilian Rosewood

BRAZILIAN ROSEWOOD
Dalbergia nigra

This brown to purplish-brown or brown wood, also known as Rio rosewood, is imported from Brazil. This colorful wood, with irregular black streaks and a few areas of orange brown background, is hard, brittle, heavy (52 pcf), and quite expensive. Trees must be 200 years old, or older, to produce the wood of most value. Figure 26 shows two types of Brazilian rosewood. The oval-shaped piece is Brazilian rosewood burl that shows the purplish tint often found in this wood while the other piece is the typical brown Brazilian rosewood most often encountered.

BRAZILIAN TULIPWOOD
Dalbergia frutescens

This hard wood from Brazil resembles Brazilian rosewood in grain

and texture, but it is a more dense wood and lighter in color. Its color runs from a light cream to a tea color, often with bright pink or reddish-orange streaks.

BRAZILWOOD

Casalpina braziliensis

This dark red wood, imported from Brazil, is hard and heavy. It is used to make dye and violin bows.

BRIAR

Erica arborea

This is a hard and moderately heavy (40 pcf) wood imported from Algeria, Greece, and Turkey. It is a rare warm brown wood with a burly figure, many 'eyes', and swirls that polishes easily to a high luster. Its prime use is for tobacco pipes.

BROWN EBONY

Libidibia sclerocarpa

This misnamed wood, not a true ebony, is imported from Mexico. It has a chocolate brown color with fine darker striping. It is a very heavy (72 pcf) and hard wood with medium texture that takes a beautiful polish.

BROWNHEART

This wood is better known as acapu, which is discussed earlier in this chapter.

BUBINGA

Guibourtia tessmannii

This pink, vivid red, or red brown wood with darker purple streaks

Figure 27. A Sample of Bubinga Showing Typical Figure and Color

and veins that give an unusual figure, is imported from Africa. Often incorrectly called African rosewood, this wood is harvested from trees 150 feet tall and 6 feet in diameter. It is a hard, heavy (58 pcf), and fine-textured wood that glues well and takes a lustrous finish. This wood must be seasoned slowly to avoid distortion. Sometimes highly figured and even though it has been used successfully for complete gunstocks, it is probably better suited for decorator items such as forearm tips, grip caps, and pistol grips. Figure 27 shows the figure and color of the bubinga.

BURL MAPLE

See the sugar maple write-up in Chapter IV.

BURMA PADAUK

Pterocarpus macrocarpus

This exotic wood is imported from Burma and the East Indies. This wood varies in color from a light yellowish-red to a bright brick red with an interlocking grain. It has a moderately coarse texture and the pores must be sealed to retain the natural color. Even though lighter in color than the other padauks, it is more dense (54 pcf) and a bit stronger.

BURMA TULIPWOOD

Dalbergia oliverii

This is a wood similar to the Brazilian tulipwood, but obtained from a larger tree indigenous to Burma. This wood is a creamy yellow with reddish-pink to reddish-purple stripes. This fine-textured wood is very heavy and fades with exposure to light. It is difficult to dry and care must be exercised to prevent checking and splitting.

CAMPHORWOOD

Cinnamonum camphora

This is a prettily marked wood found in the orient and Hawaii that is used for high class furniture. It is a soft, fragrant, coarse-grained, insect proof, and durable wood with a reddish color.

CANALETA

See the write-up on ziricote at the end of this chapter.

CANARIUM

Canarium schweinfurthii

This is a white to pinkish medium hard wood that is imported from Africa. It resembles African mahogany and may be substituted for it in most cases.

CANARYWOOD

Centrolobium paraense

This is a rich yellow tan, moderately hard and heavy (47 pcf) wood, that is imported from Brazil and sometimes has a rainbow hued coloring.

CATIVO

Prioria copaifera

Hd 610—SR 7.2—Wt 30/( )—VS ( )—St 1040

This is a light weight wood (30 pcf), with a medium to light brown color, often attractively streaked with variegated shades and tones. The texture is rather fine and uniform; it is imported from Nicaragua south to Columbia.

CAVIUNA

Machaerium acutifolium

CAUTION: DUST OF THIS WOOD CAN CAUSE A SKIN RASH.

This hardwood, native to Bolivia and also known as moradillo, has the color and appearance of East Indian rosewood, but it is richer in color and grain pattern. This wood sands well and when slab sawed, it has a most impressive figure of intermingled browns and purples. Caviuna (moradillo) is a good candidate for gunstock usage if its mechanical characteristics fulfill the gun requirements.

CEYLON EBONY

Diospyros ebenum

This is one of the black ebonies, imported from Sri Lanka, that is also known as East Indian ebony. Considered the best of the ebony woods, it is a very rare ebony that is completely black in color, heavy

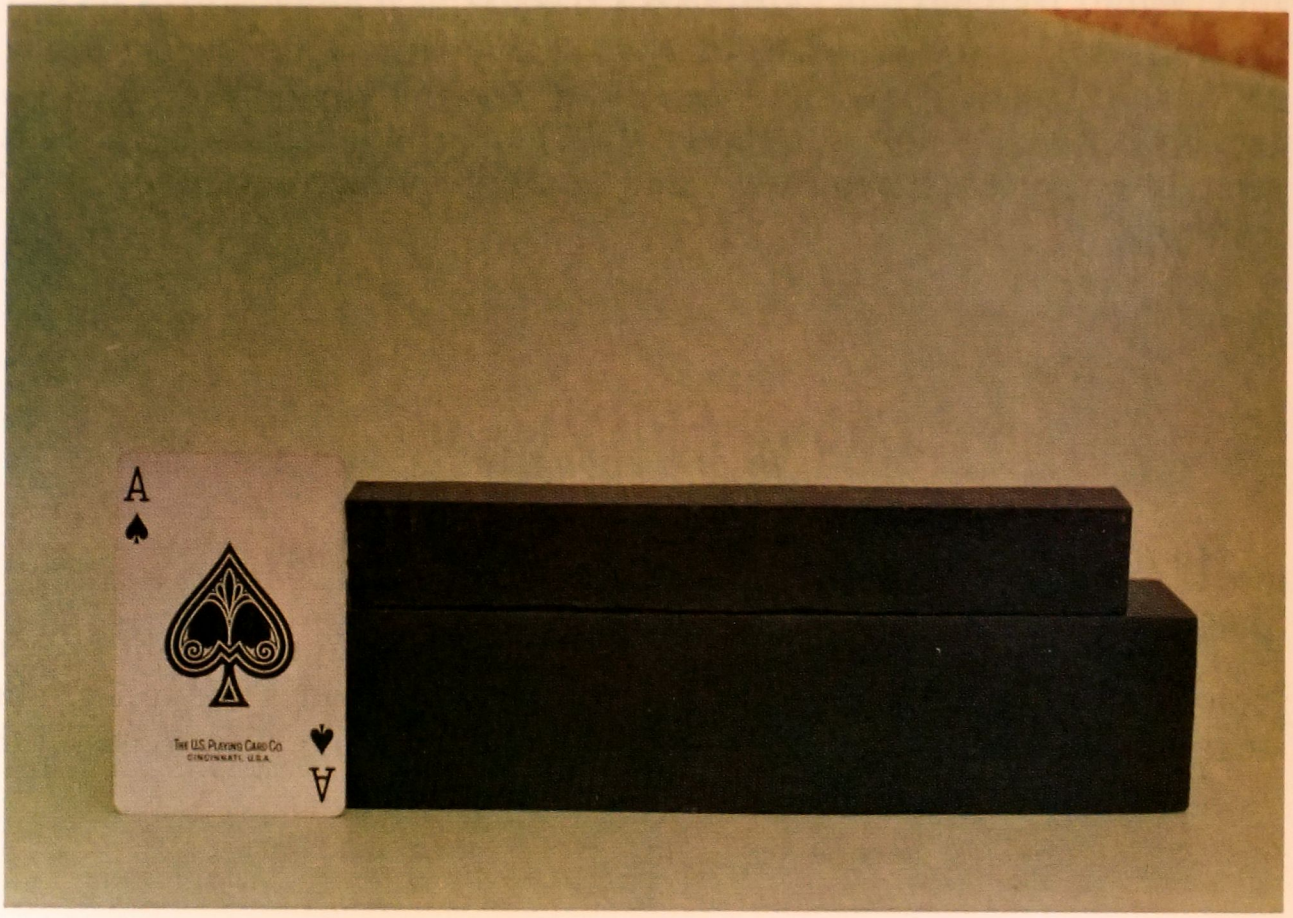


Figure 28. Samples of Black Ebony

(53 pcf), hard, and fine-textured. Sometimes with a wavy grain, it takes a fine finish and is ideal for forearm tips and grip caps. Figure 28 shows an example of the black ebony, typical of Ceylon ebony.

CHERRY, AUSTRALIAN

See the Australian cherry write-up earlier in this chapter.

CHERRY, PERFUMED

See the perfumed cherry write-up later in this chapter.

CHIN CHAN

This is a local name for Thailand rosewood which is described later in this chapter.

Figure 29. A Block of Cocobolo

COCOBOLO

Dalbergia retusa

CAUTION: DUST OF THE COCOBOLO WOOD IS TOXIC, ESPECIALLY TO THOSE ALLERGIC TO POISON IVY.

This is one of the common true rosewoods that is a dense and heavy (70 pcf) hardwood imported from Mexico and Central America. Having both straight and interlocked grain, this wood grows in the drier uplands of the Pacific seaboard and trees reach 60 feet in height with diameters of 24 inches. This variegated orange yellow to dark red wood often occurs with purple or yellow gold streaks. Often a piece is found teeming with brilliant colors of yellow, red, brown, violet, and black and fancy figure. This naturally oily wood makes excellent forearm tips and grip caps for rifle stocks, knife handles, pistol grips, and knife scales and finds many other uses where a reddish wood is needed. It is an excellent wood to checker or carve. This wood is so oily that gluing is difficult, but it holds well with the two-part epoxies that have been developed for oily woods. It is a fine-textured wood, but it

must be sealed to prevent discoloration when exposed to light and air. Figure 29 shows a highly figured piece of cocobolo.

COCUSWOOD
Brya ebenus

This dark chocolate brown to near black wood is frequently found with an olive cast and a beautifully veined figure. A false ebony, which is also known as brown, green, and West Indian ebony, this rare and expensive wood is imported from Cuba and Jamaica. It is a fine uniform-textured, hard, and heavy (74 pcf) wood that takes a high lustrous polish. The most common use is for flutes, clarinets, and tobacco pipes.

COFFEEWOOD
Libidibia granadillo

This rare wood, related to the misnamed brown ebony, is a variegated brown/black color. This heavy (74 pcf), hard, and fine-textured wood finishes smoothly with a high polish. It is imported from Mexico and Central America.

COIQUE
Nothofagus betuloides

This pale brown hard wood, with fine texture, is imported from Chile. It has a light color as beech and birch, and is often used as a substitute for these woods.

CORDIA
Cordia spp.

About 200 species of the genus *Cordia* occur in the tropical and sub-tropical regions of the Earth, but only a few appear in the

international timber trade. Two species from West Africa, *C. platythyrsa* and *C. millenii* are fairly common. These African species are coarse-textured woods that are variable in color from a pale yellow brown to chocolate. Two groups, the soft/light and hard/dark, of the Central and South American species are found. In the light colored group we find freijo and louro from Brazil, while in the dark/hard class is found bocote, Brazilian lauro, canaleta, louro pardo, and ziricote. The cordia woods all dry well and are stable once they are dry; see the following for more information.

bocote—*C. elaegnoides*
Brazilian lauro—*C. trichotoma*
canaleta—*C. dodecandra*
freijo—*C. goeldiana*
louro—*C. alliodora*
louro pardo—*C. spp.*
omo—*C. millenii*
West African cordia—*C. millenii*
ziricote—*C. dodecandra*

COROMANDEL EBONY

Diospyros quaesita

This is one of the streaked or striped ebonies, imported from Sri Lanka, having a dark black background with lighter colored streaks. Like all true ebonies, it takes a high polish.

COURBRIL

This wood is better known as jatoba, which is described later in this chapter.

CRABWOOD

Carapa guianensis

Hd 1200—SR 13.4—Wt 40/( )—VS 8.3%—St 1680

This is a reddish-brown to dark brown wood that is imported from

South America. It is a candidate for stockwood if an amply low cost supply can be obtained.

CURLY AMARANTH

This is the same wood as regular amaranth, but has a curly swirl figure or color pattern.

CURLY MAPLE

This is a type of figure found in the sugar maples which is discussed further in Chapter IV.

CURLY MESQUITE

Most of the curly mesquite wood comes from the root of the tree. Since the mesquite develops a very large and deep tap root, it quite often has more wood below ground than above. A hard strong dense wood, reddish-brown to chocolate brown in color, with an unusual figure developed by an interlocking and cross-grained structure. This scarce wood is expensive, and pieces large enough for forearm tips are rare. Figure 30 is a typical example of curly mesquite knife scales in color and figure.

DAO

Dracontomelum dao

This hardwood, imported from the Philippines, is also known as paldao. This light brown to golden brown wood, variegated with black streaks, has characteristics and color similar to Honduras rosewood. Coarse to fine in texture, depending on tree growth, it makes a good substitute for walnut in many applications, even though it is about 10% heavier. The grain is normally interlocked, but sometimes a log with wavy grain is found.

Figure 30. Samples of Curly Mesquite Showing the Typical Color and Figure

DARK RED MERANTI

Shorea spp.

This is a genus of several species of dark red hardwoods, from Malaysia and Indonesia, that are found in the international lumber trade. These are comparatively heavy (42 pcf), but not hard woods. These have a rather coarse texture, interlocking grain, and a low luster when finished.

DESERT IRONWOOD

Olneya tesota

This is a very dense hardwood found in the desert southwest. This light brown to dark brown wood, with an unusually pretty figure, finishes to a high luster.

EAST INDIAN LAUREL

See the write-up on this wood in Chapter IV.

EAST INDIAN ROSEWOOD

Dalbergia latifolia

This is one of the true rosewoods imported from southern India and Sri Lanka. This fine-textured, hard, heavy (53 pcf), and firm hardwood has been used for many purposes. Its color runs from light to dark violet brown, with purplish-black stripes, to a grayish-ebony with streaks of red or yellow. This wood appears to be oily, but it glues and finishes well. It has been used for high-class gunstocks as discussed in Chapter IV.

EAST INDIAN SATINWOOD

Chloroxylon swietenia

This hardwood, imported from India and Sri Lanka, has a yellow to pale gold color and grain characteristics very much like a mottled African mahogany. This wood has been sold, and accepted, in commerce for about 100 years as an equal to its relative, the original satinwood from Florida and the West Indies. This is a hard dense wood with interlocking grain and fine texture, that is usually more highly figured than the original.

EBONY

Diospyros spp.

Many species of the genus *Diospyros* are distributed throughout the tropics of Asia and Africa and at least two in the temperate zones of the U.S. and Japan. Ebonies are divided into three groups; those that are black or near black, those which are streaked or mottled, and the 'white' ebonies. In the black group are found,

African ebony—*D. crassiflora*
and—*D. piscatoria*
Ceylon ebony—*D. ebenum.*

Of these the best ebony, *D. ebenum*, comes from Sri Lanka, while the darkest and hardest ebony is the *D. crassiflora*, from Gabon in Africa.

In the striped or mottled group we find,

Andaman marble—*D. marmorata*
Borneo ebony—*D. durianoides*
or—*D. melanoxylon*
or—*D. tomentosa*
coromandel ebony—*D. quaesita*
king marble—
macassar ebony—*D. celebica*
or—*D. discolor*
or—*D. rumphii*
queen marble—

In the 'white' ebony group we find,

kaki— *D. kaki*
persimmon— *D. virginiana*

These two ebony woods grow in the temperate zone, with persimmon growing in the U.S., while kaki is found in Japan. See the species of interest for greater detail.

Two misnamed ebony-like woods found in international trade are, Maracibo ebony, *Caesalpinia granadillo*, and brown ebony, *Libidibia sclerocarpa*, which are unrelated to the *Diospyros* genus.

EKKI

Lophira alata

This west African timber is found from Sierra Leone to Gabon. It is a very heavy (68 pcf) and hard wood with a dark red brown or purple brown color and fine white flakes linked to the vessel lines. Coarse-textured with interlocked and sometimes irregular grain, this wood is difficult to dry or work after it is dry.

EUROPEAN PEARWOOD

See the write-up on this wood in Chapter IV.

FAUX ROSE

See the write-up on Madagascar rosewood later in this chapter.

FRIEJO

Cordia goeldiana

This hardwood, imported from Brazil, resembles teak in character and color and is sometimes incorrectly called South American walnut. It is less dense and lighter (35 pcf) than walnut and about 10% weaker than teak in strength. This wood is yellowish to brown, more or less streaked or variegated, with a fine to coarse texture. Its grain is normally straight to shallowly interlocked.

GONCALO ALVES

Astronium graveolens

Hd 2230—SR 10.4—Wt 66/( )—VS ( )%—St 2060

CAUTION: SAWDUST MAY BE TOXIC AND CAUSE DERMATITIS.

This is a very hard, strong, heavy (66 pcf), and durable wood that grows in the tropical jungles of Central and South America, especially Brazil. It is also known as kingwood, zebra wood, and bossona. These trees grow to be 120 feet in height and 40 inches in diameter. The heartwood color runs from a light golden brown to reddish-brown with blackish-brown streaks producing a beautiful striped or mottled figure with the appearance of orange sherbet. It is normally straight grained, but commonly found with contrary layers of hard and soft fibers. It is moderately hard to season to avoid checking and twisting. This fine-textured wood takes a fine glass-like finish.

GRANADILLO

Dalbergia cubilquitensis

Many imported woods are sold as granadillo, but the one most

commonly available in the U.S. is this Central American rosewood. Also known as Guatemalan rosewood, this true rosewood is an orange brown to red brown with darker striping. This is a moderately hard and heavy (50 pcf) wood that takes a fine finish.

GREEN EBONY

A non-ebony, better known as cocuswood, is described earlier in this chapter.

GREENHART

Ocotea rodiaei

Hd 2630—SR 22.0—Wt 65/.93—VS 13.4%—St 2300

CAUTION: SPLINTERS OF THIS WOOD MAY CAUSE INFECTIONS.

This is an extremely hard and heavy wood that is imported from Guyana and the West Indies. This wood runs from pale yellow green to dark brown olive often with darker, near black, markings. This fine even-textured wood is normally straight or slightly interlocked grain. This timber is hard to dry, thick pieces being prone to split and check.

GUANACASTE

Enterolobium cyclocarpum

This medium to dark brown streaked wood is imported from Central and northern South America. It resembles walnut in structure, but it is coarser in texture and is less dense.

GUATAMBU

This is another name for the wood more widely known as pau

marfim in the international timber trade. See the pau marfim write-up later in this chapter.

GUATEMALAN ROSEWOOD

See granadillo, which is described earlier in this chapter.

GUMBIXAVA

Micropholis gardnerianus

This is a reddish-brown hardwood, with medium texture, that is imported from South America. It has the general characteristics of hard maple and can be substituted where a color match exists.

HOLLY

Ilex opaca

Hd 1020—SR 10.7—Wt 40/.56—VS 13.5%—St 1710

This nearly white hardwood grows widely throughout the southeastern U.S. Its primary use is spacer material for forearm tips and grip caps.

HONDURAS MAHOGANY

Swietenia macrophylla

This is one of the tropical mahoganies described in Chapter IV.

HONDURAS ROSEWOOD

Dalbergia stevensonii

This is one of the true rosewoods that is imported from Honduras. It

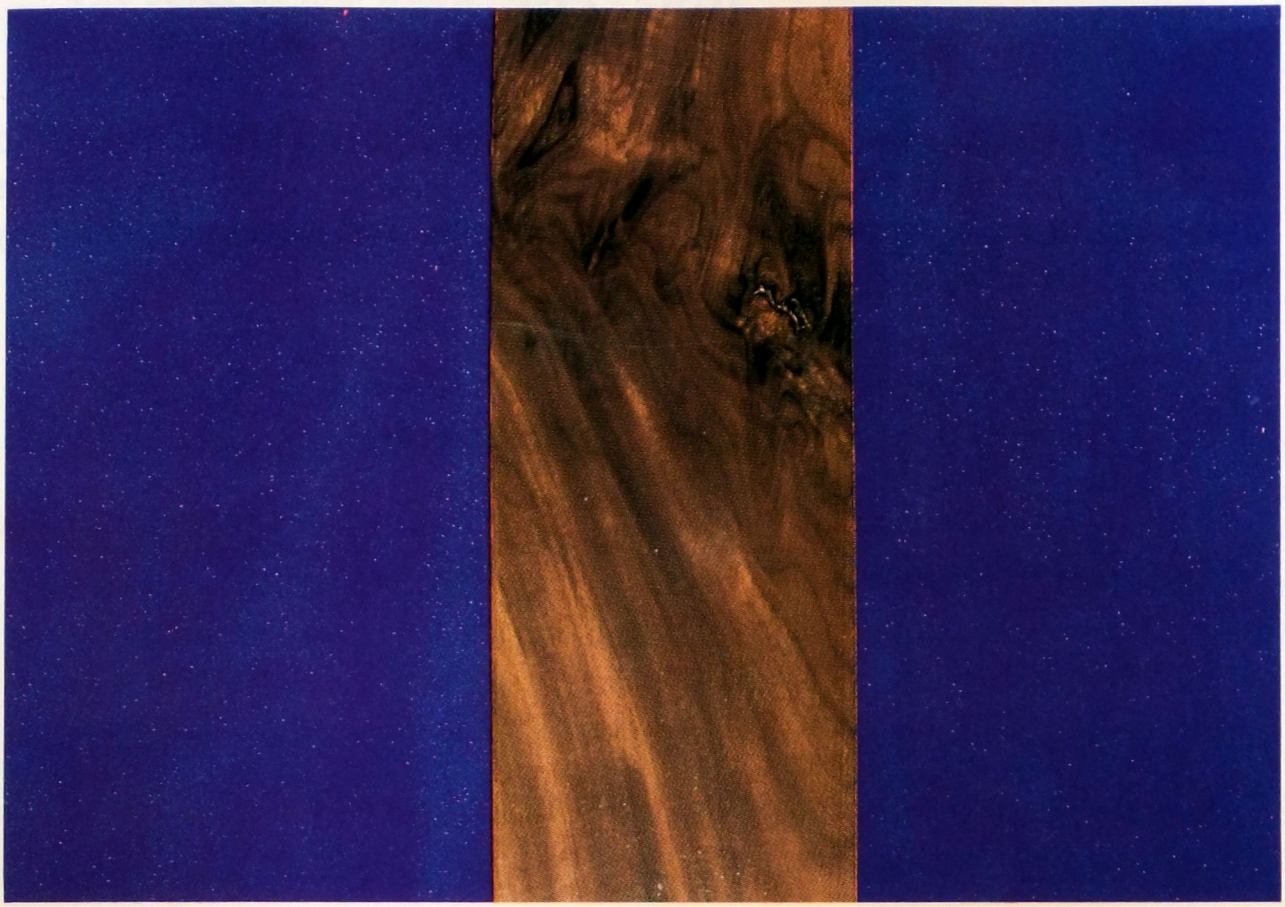


Figure 31. A Piece of Honduras Rosewood Showing Typical Figure and Color

is a pinkish-brown to purple wood and is heavy (63 pcf) and hard with medium to fine texture. Alternating light and dark color zones in this wood form a very attractive figure much like some of the Claro walnut woods. This wood makes excellent grip caps and forearm tips for custom rifles and fancy pistol grips. Figure 31 shows a nicely figured piece of Honduras rosewood with typical color and grain orientation.

HORN

Horn is most commonly used for the trigger guard, pistol grips, or butt plate or expensive guns. Most custom gunmakers prefer the water buffalo horn, though others are used. It will take a high polish, can be checkered or carved and will enhance any gun if applied in proper taste.

HUISACHE
Acacia farnesiana

Native to Texas and the southwest, this wood is a kissin' cousin to mesquite, and it is sometimes called sweet acacia. The color of this dense wood varies from a dark pink to brown, and it is used primarily for knife scales and handles.

INDIAN BLACKWOOD

This is another name for the East Indian rosewood that is described earlier in this chapter.

INDIAN LAUREL

See the East Indian laurel write-up in Chapter IV.

INDONESIAN ROSEWOOD
Dalbergia latifolia

This is the same tree as the East Indian rosewood, but found in Indonesia. See the East Indian rosewood write-up for added information.

IPE
Tabebuia serratilia

This is an extremely dense, hard (78 pcf), and oily wood, imported from Brazil, that finishes out with a lustrous brown green color. This highly figured, close grained wood is harvested from trees that grow to 200 feet tall.

IROKO
Chlorophoras excelsa

CAUTION: WET SAWDUST MAY CAUSE DERMATITIS.

The color of this wood varies from a pale yellowish-brown to a dark chocolate brown with lighter markings. It is a medium to coarse-textured wood sometimes misnamed African teak, but it is coarser and more irregular-grained than teak.

IVORY

A wide variety of ivory is used in gun decoration. Elephant ivory is of course the most common and most popular. Inlays are the most common application on rifles and shotguns. Pistol grips are made of ivory when a special decoration is needed to dress up a handgun. On rare occasions ivory is found as buttplates, grip caps, and now and then a RARE stock and forearm for a highly engraved rifle are found. Figure 32 shows a set of ivory grips on a revolver.

Figure 32. A Revolver with Ivory Grips

JARRAH

Eucalyptus marginata

This is a timber found in western Australia, having general mahogany color and characteristics. This reddish-brown wood is sometimes harvested with a mottled and curly figure. It is a very hard, heavy (52 pcf), and coarse-grained wood that must be carefully seasoned to avoid warping.

JATOBA

Hymenaea courbaril

Hd 2440—SR 17.6—Wt 60/( )—VS 10.2%—St 2470

This heavy (60 pcf), hard, and strong hardwood is imported from Central America and Brazil, and is also known as guapinol and courbaril. These trees are found in heights exceeding 100 feet and diameters of 4 feet with the strength and shock resisting ability of hickory. Its heartwood is salmon red to orange brown with pronounced darker stripes. Texture of this wood is medium to coarse and a ribbon figure is often found. It has the leguminous wood family characteristics—glows with a golden luster from within when finished smooth.

JELTONG

Dyera costulata

This soft, light weight (26 pcf) straw colored wood is found in Malaysia and the Indonesian islands. It has an inert grainless fine texture and is almost totally lacking of figure. This is a popular wood for carving models, patterns, and figures.

JEQUITIBA

Cariniana pyriformis

This is a brown medium-textured wood, imported from South America, that resembles mahogany in character.

KAKI
Diospyros kaki

This Asian fruit tree of the 'white' ebony group related to the native U.S. persimmon, is found in Japan and the Orient.

KARRI
Eucalyptus diversicolor

Karri is a hard, tough wood found in southwestern Australia. It is a dark red, medium-textured wood with wavy or curly grain.

KERUNG
Dipterocarpus spp.

Seventy species of the *Dipterocarpus* genus are found throughout the world. Only one of these, apitong, *D. grandiflorus*, is important to the custom stockmaker and woodworker. Apitong is discussed earlier in this chapter.

KING MARBLE

This is a Nigerian timber with black or dark brown irregular stripes like mottled or striped ebony. It is commonly used in place of striped ebony.

KINGWOOD
Dalbergia caerensis

This very hard and heavy (75 pcf) rosewood, imported from Brazil, is also known as violetwood. It has a rich violet brown color, shading at times almost to a black, streaked with varying lighter and darker lines of golden yellow. This wood has a fine uniform texture and finishes with a bright luster. Figure 33 shows a highly figured block of kingwood depicting the typical color and figure.

Figure 33. A Block of Kingwood Showing Typical Color and Figure

KOKKO

Albizia lebbek

Known as East Indian walnut, a misnomer, this gold to reddish-brown wood is coarser in texture than walnut, and its irregular interlocked grain gives it the appearance intermediate between walnut and iroko. It is rarely found in commerce, and a filler is generally required when finishing.

LACEWOOD

Cardwellia sublimis

This coarse-textured hardwood, from Australia and Europe, is sometimes called silky oak and selma. Its figure reminds one of lace having a fine and interwoven silky pattern. The heartwood color is light red, almost pink, to reddish-brown. A filler is generally required

Figure 34. A Sample of Lacewood Showing the Unusual Grain and Color

when finishing this wood. Figure 34 shows the unusual figure of the lacewood.

LEMONWOOD

Calycophyllum candidissimum

This is a yellowish to creamy white, sometimes brownish, colored wood that is imported from Cuba or Central America. This hard, moderately heavy (52 pcf), and fine textured wood takes a high glossy polish and is very stable in service.

LIGHT RED MERANTI

Shorea spp.

This is a light red, light weight (32 pcf) hardwood that grows in

Indonesia and Malaysia. Its heartwood is almost white to a pale pink and sometimes a pale brown. The grain is usually interlocked with coarse texture.

LIGNUM VITAE
Guaiacum officinale

One of the hardest and heaviest (77 pcf) commercial timbers, lignum vitae has a light olive green to near black color. Its grain is often roey with a fine texture, and it takes a very high polish.

LIMBA
Terminalia superba

A medium textured wood imported from West Africa, limba has pale yellow to light brown colored heartwood. It is a moderately hard wood with interesting grain characteristics that resemble bleached mahogany, and it is readily available at average cost.

LOGWOOD
Haematoxylon campechianum

This bright orange to red brown wood is imported from the West Indies, Mexico, and Central America. It is a heavy (64 pcf) hard wood with fine texture and a wood that takes a high polish with little effort.

LOURO

This is another name for freijo which is described earlier in this chapter.

LOURO PARDO
Cordia spp.

This wood, imported from South and Central America, has a

reddish-brown color. Its grain is described as wild and contrasty. Louro pardo takes on the appearance of Brazilian rosewood when stained with a red toner.

MACASSAR EBONY

Diospyros celebica, discolor or *rumphii*

Several species of striped ebony are marketed under the name of macassar. These woods are all similar in color and character and may be any one of the three species listed above. The *D. discolor* is imported from the Philippines, while the others *D. celebicia* and *D. rumkii* are found in the islands of the East Indies. These are true striped ebonies with a jet black background and yellowish, tan, reddish, or charcoal colored stripes. This wood takes a high glossy finish with a metallic luster. Figure 35 shows samples of macassar ebony in full color.

Figure 35. Samples of Macassar Ebony Showing the Typical Grain and Figure

MACAWOOD

Platymiscium pinnatum

This bright red to light reddish-brown wood, often with darker red or black stripes, is imported from Central and South America. It is a heavy (65 pcf), hard, and medium textured wood that takes a high polish.

MADAGASCAR ROSEWOOD

Dalbergia greveana

This true rosewood, imported from Madagascar, is hard, quite rare, and valuable. The heartwood color is rose to dark pink with pronounced lines of dark red shades.

MADRONE BURL

This is the burl of the madrone tree, which is discussed in Chapter IV. Highly figured with many tiny bird's-eyes or a beautiful flame pattern, this fine-textured wood takes a high polish.

MAKORE

Tieghemella heckelii

CAUTION: DUST FROM THIS WOOD MAY CAUSE EYE, NOSE, AND THROAT IRRITATION.

This medium weight wood, imported from Ghana, has an interlocking grain and fine texture. The wood has a pinkish to reddish-brown heartwood, which is a suitable substitute for mahogany. When found with an interlocked and wavy grain giving a water-silk figure, makorie becomes one of Africa's most handsome woods.

MANZANITA BURL

Arctostaphylos viscida

This is a western U.S. hardwood burl having a rich reddish-brown

color with cream colored swirls. This hard and heavy wood, with fine texture, is highly figured with tight bird's-eyes. It is difficult to season, but takes a fine smooth polish when finished.

MARACIBO EBONY
Caesalpinia granadillo

This misnamed wood has dark chocolate brown wood with paler feather-like markings. It is strong and hard, but has a rather coarse and irregular grain, and bears little resemblance to the true ebony species.

MARFIM

This wood is better known as pau marfim which is described later in this chapter.

MAYAN ROSEWOOD

This is another name for bocote which is described earlier in this chapter.

MERANTI, DARK RED

A write-up on dark red meranti is provided earlier in this chapter.

MERANTI, LIGHT RED

A write-up on light red meranti is provided earlier in this chapter.

MEXICAN ROSEWOOD

This is a misnamed rosewood, properly named bocote, which is described earlier in this chapter.

MOABI

Mimusops djave

This hard wood, imported from West Africa, has a red color and a fine texture.

MORA

Mora excelsa

Hd 2570—SR 21.5—Wt 62/( )—VS 15.1%—St 2330

This hardwood, imported from South America, has a dark reddish-brown heartwood and mechanical characteristics exceeding the walnuts.

MORADILLO

Machaeium acutifolium

This medium hard, brown variegated, and varied-textured wood is imported from Bolivia and may also be called caviuna. Figure 36 shows two typical pieces of moradillo in color and figure.

Figure 36. Samples of Moradillo Showing the Typical Color

MOUNTAIN MAHOGANY

Cercocarpus ledifolius

This misnamed clear red to dark reddish-brown hard and heavy (65 pcf) wood is indigenous to the western U.S. These trees grow to be 40 feet high and 30 inches in diameter at elevations of 4900 to 8000 feet on the dry gravelly slopes. It is an extremely fine-textured and usually straight grained wood purported to be so dense it will not float in fresh water. This wood is hard to season, but is very stable once it is dry. Although these trees are small and this wood scarce, it takes a high polish and finishes well. It is difficult, to impossible, to checker in a reasonable fashion.

MUHUHU

Brachylaena hutchinii

This hard, heavy (58 pcf), and very fine-textured wood is imported from East Africa, primarily Tanzania. The heartwood color runs from yellowish to medium brown with an interlocked grain. Muhuhu is not difficult to dry and is stable in use.

MUTENYE

Guibourtia arnoldiana

This heavy and fine-textured wood is imported from Zaire and resembles Queensland walnut in general characteristics and coloring. It has a yellow to dark brown heartwood, with black veining, and interlocked wavy grain giving it a pleasant decorative figure. This wood dries slowly with little distortion and is stable in use once it is dry.

NARRA

Pterocarpus indicus

This wood, imported from the Philippines and other South Pacific Islands, is also called amboyna when marketed in burl form. Woods

sold in Papua, New Guinea are incorrectly called PNG rosewood. The heartwood of this tree is light yellow, yellowish-brown to blood red, with darker streaks, depending on the growing conditions. This is an easily worked wood that takes a good lustrous polish.

NEW ZEALAND YEW

Podocarpus tatara

This is a medium hard, durable, medium weight (37 pcf), and strong wood found in New Zealand. This tree grows to 120 feet high and 12 feet in diameter. New Zealand yew has a deep red heartwood, fine texture, and is twist and warp-free once it is dry.

NIGERIAN EBONY

This is another name for African ebony which is discussed earlier in this chapter.

OBECHE

Triplochiton scleroxylon

This light-weight hardwood, imported from West Africa especially from areas of the Ivory Coast, Ghana, Nigeria, and Cameroon, is harvested from very large trees. Obeche trees grow to 165 feet in height and 5 feet in diameter. It is one of the lightest (14 pcf) of all the timbers classed as hardwoods, being only twice the average weight of balsa. The heartwood is a pale straw yellow with an attractive appearance and a natural luster. This is a medium-textured wood, with interlocked grain, that makes a good carving wood. It withstands rapid drying and remains stable after it is dry.

OLIVEWOOD

Olea europea

This yellowish-brown to rich greenish-brown wood is streaked with

Figure 37. An Olivewood Blank That Shows the Typical Color and Figure

dark brown lines. It is hard, heavy (60 pcf), and very fine-textured. Imported mostly from southern Europe, with a few usable sized trees being cut in California, this wood is very scarce on the American market. It has straight to wavy grain and takes a glassy finish. Figure 37 is a color photograph of a sample olive blank showing the typical color and figure.

OMO

This is another name for West African cordia which is described later in this chapter.

OVANGKOL

Guibourtia ehie

This heavy and medium-textured wood is imported from West

Africa specifically from the Ivory Coast, Ghana, and Gabon. Ovangkol is harvested from trees of 100 feet in height and 32 inches in diameter. It is related to bubinga, but having a significantly different appearance in character. The heartwood is yellow to dark brown, veined with black, and having an interlocked grain giving it the general character of walnut. This wood dries easily and slowly, with little distortion, and is stable in use once it is dry.

PADAUK

Pterocarpus spp.

Several species of padauk grow in Africa and Asia. They belong to the genus *Pterocarpus* and are related botanically to the rosewoods. The common padauks found in commerce are:

African Padauk
Andaman Padauk
Burma/Indian Padauk.

Write-ups are provided in this chapter on each of these listed.

PALDAO

See the dao write-up provided earlier in this chapter.

PANGA PANGA

This is another name for wenge which is discussed later in this chapter.

PARTIDGEWOOD

Andira inermis

This is a yellowish, reddish or brown hard, heavy (53 pcf), and tough wood that grows in tropical America. It has a very coarse texture, irregular grain but takes a good finish if filled before finishing.

PAU AMERELLO
Euxylophora paraensis

This is a hard bright yellow medium-textured furniture wood that is imported from Brazil.

PAU FERRO
Caesalpinia ferrea

CAUTION: WOOD DUST MAY CAUSE DERMATITIS.

Several species of this tree produce this reddish-brown to dark violet brown wood. More or less streaked, it is imported from South America, principally Brazil. It is a very hard, heavy (53 pcf), and varied-textured wood that finishes with a high luster.

PAU MARFIM
Balfourodendron riedelianum

This pale yellow wood, imported from Brazil, Paraguay, and Argentina, is harvested from trees that grow to 80 feet in height and 32 inches in diameter. It is a heavy (60 pcf) and fine even-textured wood normally with a straight grain, but often found with a wavy grain. Pau marfim has a high resistance to shock, takes a high polish, and with its texture and density closely matches sugar maple.

PAU ROSA
Swartzia fistuloides

This very hard and heavy wood is imported from West Africa and has an orange to reddish-brown color with red brown stripes. It is medium in texture, high in luster, and takes a beautiful smooth finish.

PERFUMED CHERRY
Prunus mahaleb

This wood is indigenous to Europe, especially Austria, and is also

known as Mahaleb cherry. It is a hard wood harvested from small slender trees that bear fragrant white flowers and small inferior fruits. The heartwood is a red brown with green streaks or olive green and except for small amounts of the wood used for walking sticks and tobacco pipes, its major use is the root stock for grafting of other cherry cultivars.

PERNAMBO

Guilandina enchinata

This is a bright orange to orange red wood that is imported from the states of Pernambo and Bahia in Brazil. It is very hard and heavy (88 pcf), has a fine texture, and takes a lustrous finish. It has the right combination of strength, weight, and flexibility for violin bows.

PINK IVORY

Berchemia zeyheri

This bright pink to pale red wood, imported from East and South Africa, is hard and heavy (70 pcf) with fine texture. It takes a beautiful high polish and is rare and very expensive. Figure 38 is a sample of this wood demonstrating the color and texture.

PITOMBA

Zollernia tango

This is a dark reddish-brown wood with dark streaks and often with a 'partridge-wing' figure. It is hard and heavy (78 pcf), somewhat brittle, but finishes with a high natural polish. It is imported from Belize, Brazil, and Honduras.

PRIMA VERA

Cybistax donnell-smithii

Hd 700—SR 10.3—Wt 30/( )—VS 6.6%—St 1700

Figure 38. An Example of Pink Ivory Showing the Typical Color

This white mahogany type of wood, imported from Central America, has straight grain and a medium to coarse texture. Its heartwood has a yellow white to yellow brown color.

PURPLEHEART

Peltogyne pubescens

Hd 2760—SR 20.0—Wt 50/.67—10.6%—St 2210

This dark purple hard wood, imported from South America, is related to amaranth and is often, incorrectly, considered to be precisely the same wood. There are about 20 species of wood with the genus *Peltogyne*, two of which are purpleheart and amaranth. This is a fine-textured wood, with a variety of grain structures, including wavy and roey, that finishes in a high variable luster. The purple heartwood

eventually turns to a deep brown unless it is protected by a good finish.

PUTUMUJU

Centrolobium robustum

This is a yellow, red, and black wood, with some tinges of green, imported from South America. It is moderately heavy (55 pcf), stable, and finishes smoothly.

QUEEN MARBLE

This is one of the striped or streaked true ebonies, imported from Nigeria, with a black background and light irregular stripes of brown or charcoal.

QUEENSLAND WALNUT

This misnamed walnut-like wood, imported from Australia, is marketed in the U.S. as orientalwood. See the orientalwood write-up in Chapter IV for more detail.

RAMIN

Gonystylus bacanus

This straight-grained wood is imported from Malaysia. The heart and sapwood are creamy white to pale straw in color and this wood, except for a lower value of shock resistance, is comparable to the American birches.

RAULI

Nothofagus procera

Hd 690—SR 12.8—Wt 34/( )—VS 8.4%—St 1500

This is a rather soft wood imported from South America. It has a reddish-brown heartwood with darker streaks.

RED ALDER

Alumus ruba

Hd 590—SR 8.4—Wt 28/.41—VS 10.1%—St 1080

This is a wood that grows on the west coast shoreline of North America from California to Alaska and is the largest of the native alder species. It is used mainly for carving, firewood, and smoking of fish and meat. Alder has open grain and an off-white to reddish-brown color. It can be stained to resemble maple, cherry, and many other hardwoods.

RHODESIAN TEAK

Baikiata plurijuga

This wood, imported from Rhodesia and Zambia, is not a true teak but it does have comparable properties. It has a rich reddish-brown color, occasionally with darker flecks. The attractive figure is mostly derived from color variations rather than grainflow. This fine-textured wood is heavier than true teak (56 pcf) and is stable in use once it is dry.

RIMU

Dacrydium cupressinum

This is a pine type of wood, indigenous to New Zealand, with a hard chestnut brown heartwood. It is a good furniture wood that resembles a satin walnut and takes a good finish.

RIO ROSEWOOD

This is another name for Brazilian rosewood which is described earlier in this chapter.

ROBLE

Tabebuia rosea

Hd 830—SR 11.0—Wt 36/( )—VS 7.7%—St 1130

This hard, light grayish-brown, and fine-textured wood is imported from South America. Except for color, its properties are comparable to the American beeches.

ROSEWOOD

Dalbergia spp.

All true rosewood species, which are marketed in the international timber trade, are members of the *Dalbergia* genus. Trees of this species occur in Central and South America, Africa, India, Burma, and Thailand. They are all dense dark strong timbers and, with a few exceptions, they are dark brown or reddish-brown in color with very dark colored streaks or irregular stripes.

Three of the most common rosewoods in commerce are from South America and are Brazilian or Rio rosewood *(D. nigra)* and two other closely related woods from Brazil known as kingwood *(D. caerensis)* and Brazilian tulipwood *(D. frutescens)*. Two others, cocobolo *(D. retusa)* and Honduras rosewood *(D. stevensonii)*, are Central American species.

The only important rosewood from Africa is known as African blackwood *(D. melanoxylon)*. East Indian rosewood *(D. latifolia)* is from Sri Lanka and shisham *(D. sissoo)* is found in northern India. Two other Asian species are also found in the timber trade. These Asian species include Burma tulipwood *(D. oliveri)* from Burma and Thailand rosewood or chin chan *(D. cochinchinensis)* from Thailand.

Bubinga is often misleadingly referred to as African rosewood, but bubinga is really a member of the *Guibourtia* genus. See the following for more information.

African blackwood—*(D. melanoxylon)*
Amazon rosewood—*(D. spruceana)*
Brazilian rosewood—*(D. nigra)*
Brazilian tulipwood—*(D. frutescens)*
Burma tulipwood—*(D. oliveri)*
Chin chan—*(D. cochinchinensis)*

Cocobolo—*(D. retusa)*
East Indian rosewood—*(D. latifola)*
Granadillo—*(D. cubilquitensis)*
Honduras rosewood—*(D. stevensonii)*
Indonesian rosewood—*(D. latifola)*
Kingwood—*(D. caerensis)*
Madagascar rosewood—*(D. greveana)*
Rio rosewood—*(D. nigra)*
Shisham—*(D. sissoo)*
Sissoo—*(D. sissoo)*
Thailand rosewood—*(D. cochinchinensis)*

The commonly misnamed rosewoods are,

African rosewood—*(Guibourtia demeusei)*
or—*(Didelotia africana)*
Bubinga—*(Guibourtia tessmannii)*
Mexican rosewood—*(Cordia elaegnoides)*

SANDALWOOD
Santalum album

This hard, heavy (64 pcf), and fragrant wood is found in India, Malaysia, and Australia. The true sandalwood from India is considered the best. It has a yellow brown heartwood with very fine texture and is a popular wood for carving.

SAPELE
Entandrophragma cylindricum

Trees that produce this wood are widely distributed throughout tropical Africa from Sierra Leone to Uganda and Zaire. It is a mahogany-like wood noted for its striped figure on the quarter sawn lumber. Fiddleback and mottle figures are also found on occasion. Sapele is darker in color, finer-textured, heavier, and stronger than African mahogany, but it is not as stable in use. It is commonly substituted for mahogany in building trim.

SATINWOOD

See the East Indian satinwood write-up earlier in this chapter or the West Indian satinwood write-up later.

SHEDUA

Guibourtia ehie

This wood, the same genus as bubinga, is imported from Africa. It has a coloring, yellow brown to dark brown with gray to black stripes, that often resembles American black walnut. It is high in luster, moderately heavy (50 pcf), and even though coarse-textured, it takes a good finish. (This is the same tree as ovangkol described earlier.)

SHISHAM

This is another name for a true rosewood better known as sissoo which is described later.

SILKY OAK

See the earlier write-up on lacewood.

SISSOO

Dalbergia sissoo

This is the famed black wood used in oriental furniture which is a very rare true rosewood imported from northern India. The heavy, hard, strong, and elastic heartwood is fine-textured and seasons well without warping or splitting. Sissoo color varies from a light brown to a dark reddish-brown with darker streaks.

SNAKEWOOD

Piratinera guianensis

This is a very hard wood, imported from Guyana and Sirinum, that is also known as letterwood. It is heavy (88 pcf), one of the very few woods that is heavier than lignum vitae, with a fine texture. The thick heartwood is a red to reddish-brown with irregular black speckles or stripes. Snakewood is strong, but somewhat brittle, and takes a high natural polish. This is a very expensive wood used for walking sticks, bows for the large stringed musical instruments, knife scales, and handles. Figure 39 shows samples of snakewood displaying the typical markings.

SOUTH AFRICAN BLACKWOOD

Royena lucida

This black colored wood, imported from South Africa, resembles ebony and can be substituted for it in most applications.

SPEARWOOD

Acacia aneura

This is a very hard, striped brown, and fine-textured wood imported from Australia.

STINKWOOD

Ocotea bullata

This wood is imported from South Africa and is also misnamed Cape walnut. This is a tough and durable wood, with a walnut type of mottling, which is a golden, often iridescent brown. The better marked woods are used for furniture.

STREAKED EBONY

This is the European terminology for striped or mottled ebony.

Figure 39. Snakewood Samples Showing Color and Markings

STRIPED BUBINGA

This is a special grain coloration of regular bubinga having many, many more stripes of darker red or purple color.

STRIPED EBONY

Diospyros spp.

This wood includes any one of the many species of the genus *Diospyros* that has a black background and streaks or stripes of a lighter colored wood. These are also called mottled ebony. For more information see the following:

Andaman marble
Borneo ebony
coromandel ebony
king marble
macassar ebony
queen marble

SUCUPIRA

Bowdichia nitida

This coarse-textured wood, imported from Brazil and Venezuela, has a heartwood of a deep chocolate brown with lighter brown stripes. A very dense and hard wood purported to be inexpensive.

TAMBOOTIE

Spirostachys africanus

This yellow brown to chocolate brown wood, with darker brown streaks, is imported from South Africa. It is a moderately heavy (56 pcf) wood, with a very fine texture, that takes a high polish.

TAMO

Fraxinus mandshuriea

This is a timber that grows on the north island of Hokkaido and in Korea. It is also known as Japanese ash and is popular with the Japanese furniture makers. Tamo has a yellowish-white to pale brown heartwood, often with a wild grain pattern. It is medium hard with coarse texture and has a high resistance to shock.

TASMANIAN BLACKWOOD

This is another name for the Australian blackwood which is discussed earlier in this chapter.

TCHIOLA

Oxystigma oxyphyllum

This straw yellow to medium brown wood comes from timber harvested in Nigeria and Angola. It has straight to shallowly interlocked grain, with a rare piece having wavy grain. This moderately

coarse-textured, medium weight (slightly lighter than walnut) wood dries well and remains stable once it is dry. Its properties, except for color, are comparable to walnut. Prime use of this wood is for decorative surfaces on furniture.

TEAK

Tectona grandis

Hd 1110—SR 10.3—Wt 40/.58—VS ( )—St 1600

CAUTION: MAY CAUSE DERMATITIS IN SOME INDIVIDUALS.

This is a grand wood imported from Burma, China, India, Indonesia, Sri Lanka, Thailand, and Vietnam. It is a beautiful wood that varies in color from a dark golden yellow to a dark brown, with blotches and streaks of various shades of color. Teak is a coarse-textured wood, sometimes wavy-grained, with a grain structure much like walnut and occasionally found with a mottled or fiddleback figure. It is tough, strong, and oily, and except for the oil, would have a character much like walnut. Teak takes a good finish and is used extensively in marine construction. Even though oily, it glues well. Many other woods claim to be teak, but in many cases they are not even related or good substitutes.

THAILAND ROSEWOOD

This true rosewood, formerly known as 'Rosewood of Siam' and Cochin-China, is the same species as chin chan discussed earlier in this chapter.

THUYA BURL

Tetraclinis articulata

This golden brown to red wood is found in the burl of the thuya tree. It is highly figured with many small eye clusters of a moderately heavy (42 pcf) wood that is imported from Algeria or Morocco.

TIGERWOOD

This is another name for African walnut described in Chapter IV.

TOTARA

See the earlier write-up on New Zealand yew in this chapter.

TULIPWOOD, BRAZILIAN

See the Brazilian tulipwood write-up earlier in this chapter.

TULIPWOOD, BURMA

A write-up on the Burma tulipwood is provided earlier in this chapter.

TUPELO GUM

Nyssa aquatica

This tree is more accurately named water tupelo, but the principal users of this wood, the decoy and duck carvers, know it as 'tupelo gum'. It is a fast growing tree scattered throughout the swamplands of the Gulf and East Coast. The wood has a light tan to creamy white color, fine almost inert cross grain, with no discernible direction of flow. The swollen buttress of the tree is the material preferred by the carvers. It is light weight, almost like balsa, soft, and quite weak. Tupelo gum carves, sands, and finishes easily; it can be finished with almost any desirable paint or varnish and is quite stable once it is dry.

TURKISH BOXWOOD

Boxus sempervirens

This light creamy yellow wood is imported from Southern Europe

and Western Asia. It is a hard and heavy (63 pcf) extremely fine grained wood that polishes easily and is often called Persian or Circassian boxwood.

UTILE

Entandrophragma utile

This is a mahogany colored wood with coarse texture and interlocked grain. These trees grow in West Africa, mainly in the Ivory Coast and Ghana. It is a mahogany-like wood that is used for building trim.

VERA WOOD

Bulnesia arborea

Vera wood is a yellowish-olive, often beautifully figured, wood with blackish-green markings. Imported from South America, this fine textured, very hard and heavy (76 pcf) wood takes a high polish.

VERMILLION

See either African or Andaman padauk write-ups in this chapter.

WACAPOU

Vouacapoua americana

Hd 1730—SR 17.0—Wt 59/( )—VS 10.4%—St 1890

This is a dark olive to chocolate brown wood that is better known as acapu which is also discussed earlier in this chapter.

WALNUT

Juglans spp.

See the walnut section in Chapter IV for the listing of the specific species described in this text.

Figure 40. A Piece of Wenge Showing the Typical Color and Figure

WENGE

Millettia laurentii

Also known as panga-panga, this coarse-textured wood is imported from Zaire, Cameroon, and Ghana. It is a dark brown color with close wavy black streaks. This hard and heavy wood works well but needs to be sealed to retain its natural color. It is scarce, valuable, and difficult to glue. Figure 40 shows a view of the wenge sample which exemplifies the color and figure found in this wood.

WEST AFRICAN CORDIA

Cordia millenii

Imported from West Africa, this wood has a color of pale yellow to chocolate and occasionally with a pinkish tint. Unlike its relatives, it is a light weight (25 pcf) wood with coarse texture and typically interlocked grain. It is a stable wood once it is dry and takes a lustrous finish.

WEST INDIAN BOXWOOD

Gossypiospermum praecox

This is a lemon yellow to near white wood with very fine uniform texture and high luster. It is a moderately heavy wood (53 pcf) imported from Cuba and the Dominican Republic.

WEST INDIAN EBONY

This is not a true ebony and is better known as cocuswood which is described earlier in this chapter.

WEST INDIAN SATINWOOD

Zanthoxylum flavum

CAUTION: FINE DUST OF THIS WOOD MAY IRRITATE THE SKIN.

This timber, from Florida and the West Indies, was the original satinwood marketed in the international lumber trade. It is a creamy yellow to golden yellow wood with fine even texture. This wood is heavy and normally straight-grained and a unique appearance of bright, satiny sheen and sometimes with a wavy grain that enhances the figure. Its most common use is for inlays.

YEMERI

Vochysia hondurensis

Hd 550—SR 7.6—Wt 28/( )—VS 7.8%—St 1070

This dull, uniform pink, pinkish-brown, or golden brown, wood has moderately coarse texture and highly interlocked grain. It is a medium heavy (36 pcf) wood imported from tropical America.

ZEBRAWOOD

Microberlinia brazzavillensis

This is a wood of great beauty, imported from equatorial Africa, primarily Cameroon and Gabon, which has a light tan background with deep brown or blackish stripes. This wood, also called zambro, is prone to twist in drying. This heavy (53 pcf) wood has high resistance to shock and is widely used for grip caps, forearm tips, and pistol grips. Zebrawood is difficult to checker due to its open grain and coarse texture, and it must be sealed to retain its natural color. Figure 41 shows a highly figured piece of zebrawood.

ZIRICOTE

Cordia dodecandra

This wood, often called ciricote and of the *Cordia* genus, is a tobacco brown to reddish-brown in color with irregular dark brown or blackish streaks and variegations. It is a hard and heavy (55 pcf) wood with wavy interlocked grain and is imported from Mexico, Central, and South America. It takes a high polish and is stable in service. A typical piece of ziricote, in color and figure, is shown in figure 42.

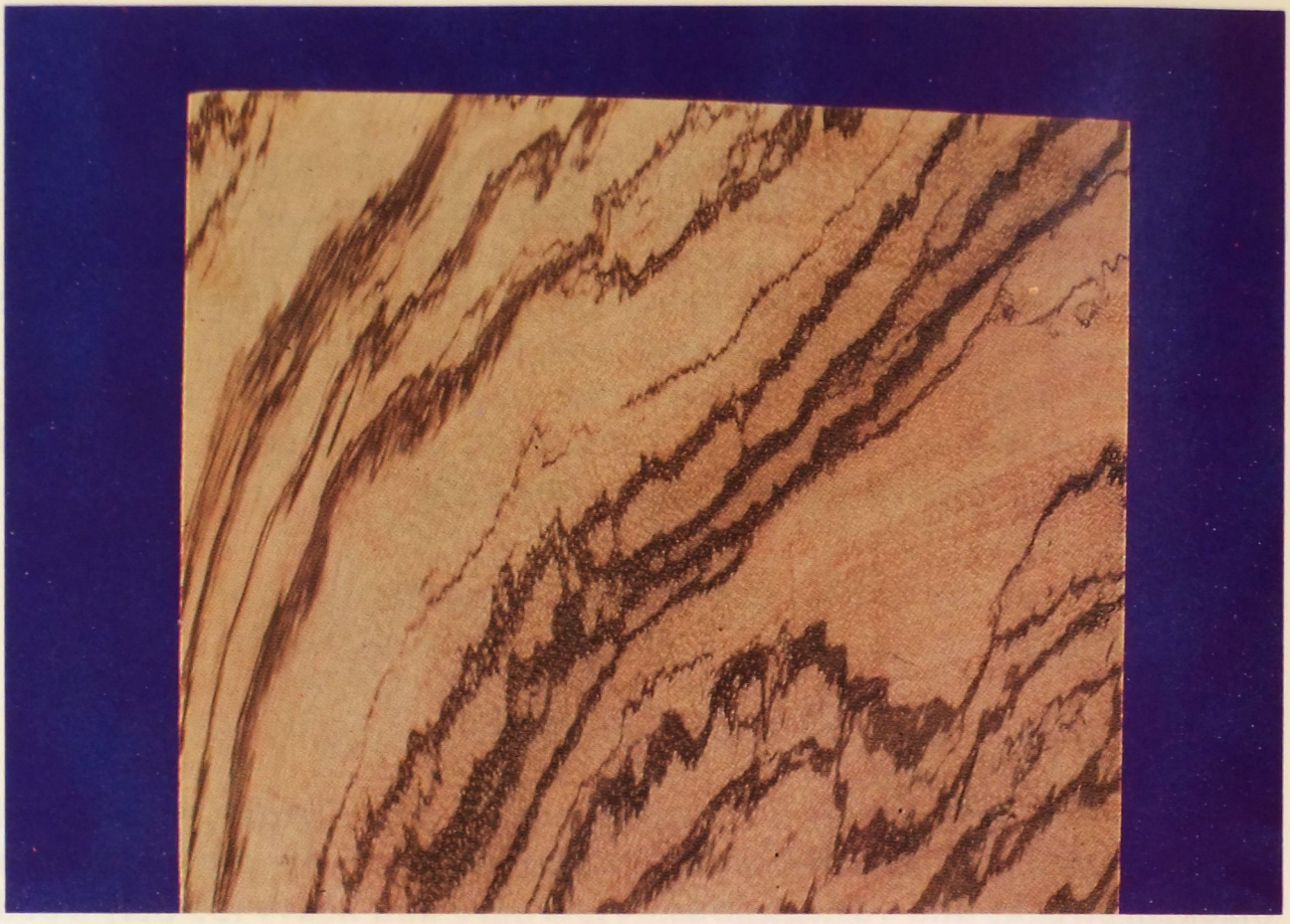


Figure 41. A Highly Figured Piece of Zebrawood

Figure 42. A Typical Piece of Ziricote in Color and Figure

CHAPTER VI

CUSTOM GUNS AND CUSTOM STOCKWORK

A classic definition of a custom gun is, "A firearm made for you, a specific person, to your requirements and specifications, your needs and desires." It is like a tailor-made suit, custom fit to you; it 'suits' you and may not fit anyone else. Even though most custom gunmakers would not argue vehemently with the above definition, there are probably as many versions of this definition as there are craftsmen that ply the trade. A custom gun is an instrument made of the highest quality materials and with the finest first class workmanship. It is commonly an expression of the gunmaker's excellence of workmanship and artistic skills with a fit and finish of the highest standards. It would be, in terms of the English makers, a 'bespoke' gun. Or it may be a special order gun, fit to your measurements and produced by one of the high-class European gun houses, with several factory extras such as a specially selected high-grade piece of wood, fancy embellishments, multi-barrel sets, and special sights. A custom gun, while normally produced by a specialized craftsman, or group of craftsmen, can in fact be made by anyone, including the owner, for the owner, and to the owner's requirements, specifications, and desires provided the builder has the required skills and technical capability.

There is a certain amount of confusion and difference between a custom gun and a customized gun. Any modification to a factory gun is, in the simplest form, some level of customization. This applies to any change made to enhance the beauty or upgrade the quality of the firearm, to add prestige, or to increase its value. Included also are modifications performed to improve the functioning, increase the reliability, or in any manner make it of greater benefit to the owner. These steps help to bring the firearm one small step nearer to qualifying as a custom gun, but to truly be a custom gun it must fulfill the criteria given in the first paragraph.

Selecting a custom gunmaker depends mostly on just what tasks you want the professional to perform and a great deal on how much you can afford. Finding and choosing a custom gunsmith is not always an easy task. Many excellent professionals are available to perform the needed services, but the most common problem encountered is that most all of them are busy. Many of them have backlogs of one or two years and when you think of the number available, the prices expected

for their services, and the waiting time, it is not obvious to the casual observer why this is true.

Let us first address the time factor. If you went to a custom gunmaker today with firm requirements and upfront cash, he would need two or three months to collect all the materials needed (stock blank, barrel, action, special buttplate and grip cap, exotic wood for the forearm tip, etc., etc.). Even if he is fortunate enough to have all of the items on hand to fulfill your requirements, time is still required to put all the pieces together, in proper form and sequence, and to do all the serial work necessary to complete the construction of the firearm. Then he must finish, checker, blue, test, fine tune, and touch-up the piece before delivery. Custom gunmakers are more artist than mechanic, which is fortunate for the buyer, as they are, therefore, prone to work on the border of perfection. Work is not normally done in true serial fashion, since the craftsman, in order to be cost effective, will do jobs in a consolidated manner. For example he will blue a group of barrelled actions at one time, put the finish on 3 or 4 stocks, or alter a brace of bolts. Some jobs like inletting and fitting a stock to the metal and checkering are totally independent serial tasks.

Not many custom gunmakers do the whole job on a custom gun. Some are expert in stocking, others in metal work, others in engraving, and so on. Therefore many custom gunmakers only do a part of the job, the part in which he is most expert, and he then farms the balance of the work out to a qualified and trusted colleague expert in that facet of work. Whenever this is done the custom maker you have contracted to make your gun will take full responsibility for all work, will fulfill all warranties, and perform any required rework. In some cases custom smiths work as a team, one doing the metalwork, another the stocking, and a third does the engraving, like the David Miller Co. of Tucson, Arizona. David Miller is the metalsmith, Curt Crum does the stockwork, and Lyton McKenzie is the engraver.

Early on many custom smiths develop special or unique capabilities—tasks he either prefers doing or excels in performing. This quite often leads to specialization in that facet of work and development of a NAME as the BEST by his peers. Some are equally proficient in two and even three special skills, but one skill is most common in the trade with a tri-skilled person rare and unusual. Once a custom gunmaker has established a following he is in a position to name his price for his services, but many of them do not take advantage of such a situation, preferring to serve their customers the best they can with fair priced custom work. When a backlog exists, new customer orders are given a lower priority than old customers to

give the old customers preferential treatment.

The custom gunsmith can be likened to an artist in personality and character—an absorbed artist, a creator of ideas, a generator of designs, a busy artisan trying to satisfy all customer requests. He is his own most critical evaluator attempting to reach perfection in his skill. He has to develop the respect of his peers as well as be judged by the public. This is not an overnight accomplishment but takes a very long time and much hard work to consistently demonstrate his individual skills and expertise.

Most custom gunsmiths are helpful and will go out of their way to accommodate your requests. They will make suggestions and propose ways to attain your goals. You can help your custom gunmaker by giving him a free hand to let him be creative. Allow him the freedom needed to do his job. Define your requirements and desires, but don't detail the specifications, i.e., "The trigger pull should fit me." (Not "The trigger pull shall be 13¼ inches.") It may well end up at 13¼ inches, but let him make the determination; it could have as easily have been some other value with the new stock style. Remember he is the expert. You don't tell your medic how to treat your ailment—so don't try to direct your stockmaker in how to build a stock.

Many custom gunsmiths are, understandably, reluctant to divulge their special trade techniques. Only a few are willing to allow anyone to watch them practice their expertise, while others are perfectly happy to pass on all their knowledge.

Some artisans are biased, often for good reason, and some have tunnel vision on certain facets of the work and the manner it should be accomplished. Some are cranky, cantankerous, and headstrong. Some are downright pig-headed and ornery, but these latter types don't often survive long in the trade. You must surely realize that personality clashes do occur and are more common with those of high intellect and artistic character. If you are the type that is good at rubbing the cat's fur the wrong way—be tactful and give the gun craftsman the benefit-of-the-doubt and try to avoid a clash.

How much does a custom gun cost? That is a question like "How high is up?" and about the best answer is 'PLENTY', but every dollar spent is well worth the investment, whether it is spent on embellishment, adjustment of the gun to your body or shooting style, or fitting to your preferences. Costs of the work has several contributors, not just the NAME or integrity of the custommaker, but many other expenses that contribute to the final tally. Custom gunsmiths have a tremendous investment in hand tools, equipment, and precision machinery. He has a huge investment in inventories of

stock blanks, exotic woods, gun parts, and accessories. As an example, consider the four most popular walnuts, English, Bastogne, Claro, and American black. Three blanks of the upper grades of each alone, a total of 12 blanks, will run between $2000 and $3000, and that is only about half enough inventory of wood to give a customer a decent selection from which to pick and choose. He has most likely served a multiyear apprenticeship with a well known gunmaker or large corporation that specializes in building custom guns. Or he has spent two or three years in one of the gunsmith colleges that specialize in teaching of the gunsmith crafts and technical expertise. Whichever path that was followed, he has spent many years of training and practice of the craft to develop his expertise and hone his skills. In fact he may have spent as many hours in training as your family physician or surgeon.

Cost considerations should be of secondary importance in planning the order of a custom gun. Even though not many of us are financially fixed to ignore the expense part, craftsmanship and quality should be the controlling factor. There are ways to work around the cost element, if it turns out to be a problem, but there is no substitute for fine workmanship.

It is very difficult to compare costs of a custom built gun—what is the point of reference? Not a factory production gun. Only perfection in craftsmanship and fine workmanship can be the criterion for judgment. So ONLY another custom gun can serve as a benchmark of comparison.

Production factory guns are mass produced for the average shooter. But how many shooters are average? How many could shoot better if the gun truly fit them; was designed and built to suit their shooting style, desires, and personal requirements? Many, many trap and skeet shooters either have special built guns, or try many different guns until they find one they can shoot best. Maybe not the very best, but the best of all they have tried. A custom-fit gun would not only improve their score but make shooting an afternoon of skeet or trap much more enjoyable. Field hunting is about the same story, but it is an unusual day in the field when you shoot 100 rounds at live birds. If you are lucky enough to find that many birds, you would have limited out long before or given up since you were shooting so poorly; you would swear and be sure something was wrong with the gun. Rifles present a similar type of problem, but these are more related to consistent accuracy, reliable fast shouldering of the rifle, and range judment; all of which can be improved by having a gun special built to your physique and requirements. Your custom gunsmith can help with all these shooting

improvements and will be happy to make suggestions that will assist in overcoming many of the shooting pitfalls.

The final cost of your custom gun will somewhat depend on your specified requirements. Anything special or extra, anything out of the ordinary or unusual may cause an extra charge. Did you require a higher than normal cheekpiece, or a longer than standard trigger pull? Did you request an exhibition grade of rare wood with an exotic grip cap and forearm tip? Many of these are not extra charges, within certain limits, but outside those limits extra costs must be added. Suppose you request a mannlicher length stock made of marblecake English walnut having a 15 inch trigger pull and an extra high roll-over cheekpiece. This requires the custom gunmaker to obtain a special blank from his wood supplier, since it needs to be longer up front, and longer and wider at the butt end. Chances are pretty high this blank would have to be cut special from a flat slab at the sawmill and the drying completed before it can be final inletted.

What the final cost might be also depends somewhat on how well known the custom gunmaker is. It should be obvious that a gun custom built by Mike Yee or Jerry Fisher and many others will cost more than one built by a yet unknown artisan, and the guns could be equivalent in all respects of workmanship and quality. So name is important, a well known custom maker's work will command a higher price just like a famous artist's painting has a bigger price tag.

Finally your gun is completed after many gauging and testing operations and over 300 manual processes where the trained hands and expert eyes of the true artisan have added rich quality no machine can replace. As your gun passes the last inspection and scrutiny by the custom gunmaker, his talents and pride, that have gone into the creation, are notably apparent.

Up to now the discussion has mostly focused on the what and not the WHO can be of of the greatest service. To choose a custom gunmaker for your project or order, the following qualifications need to be factored into the selection:

1. Try to find a custom gunsmith near you. This is not mandatory, but it sure is easier to discuss things in face-to-face communications than by correspondence or telephone. The American Custom Gunmakers Guild membership list would be a place to start, keeping in mind that a great many excellent, highly skilled, and qualified custom gunmakers are not members of the guild for a variety of good reasons.

2. Consider any custom gunsmith with a good reputation. Carefully

examine his work and interview at least three of his recent customers to verify his integrity, honesty in delivery, cost, and fulfillment of specifications and requirements. (Maybe these customers will also identify some of the gunmaker's personality traits or unique interfacing unknowns).

3. Ascertain that the custom smith is willing to tackle your project and is skilled in the special facets you desire.

4. Determine if he has a time slot for your work that will bring the job to fruition in time to fit into your schedule and use plans.

5. Make sure you can afford his services. Most custom makers request 50% of the cost of the work upfront with the balance on completion of the job.

If you find a craftsman that fulfills all the above criteria, give him your order and deposit to get the work started so you can take pride in your custom gun for your next shoot or hunt. If you have any reservations, contract your work in increments. Try a task or facet of the work and make a decision at the end of this juncture if you want to go forward with this custom gunmaker or to move the work to another craftsman. Try to avoid stopping the task in midstream because that could be expensive and many custom smiths are very reluctant to take over work started by others.

There are at least four ways to obtain a custom or classic gun.

1. Pay a custom gunmaker to build it to your specifications.

2. Have a metalsmith of your choice do the metal work; have a stockmaker of your choice make the stock and have the engraving done by your choice of engravers.

3. Have a custom metalsmith do the metal work; have your selection of gunstock blank semi-inletted by one of the stock companies, you do the final inletting and finishing, and then have an engraver do the engraving desired.

4. Do all the metal work and finsih the semi-inletted stock yourself, then get the engraving done by your choice of engravers.

There is a myriad of combinations of the above and how you do it

depends mainly on which you have more of, TIME or MONEY, but most hardworking people have little of either. Keep in mind that the home workshop can handle many of the tasks with a minimum of machine tools and that almost ALL mistakes are repairable or recoverable.

Many customizing operations can be done on the installment plan with respect to conservation of both time and money. For example, suppose you own a decent bolt action rifle with a usable stock but not up to the standards your prefer.

STEP 1—Clean up the barrelled action, blue it and install a scope or sight system you desire and utilize the old stock until you find the time or money to replace it.

STEP 2—Build a new stock of the style you want with a high-grade piece of wood and fit it to your barrelled action.

STEP 3—Get the stock checkered with whatever fancy pattern will make the gun fit your preconceived standards.

STEP 4—Damaskeen/jewel the bolt and checker the bolt knob.

STEP 5—Get the floorplate and trigger guard engraved.

STEP 6—Have the receiver engraved.

STEP 7—Put some engraving on the barrel.

The individual with a bit of craft ability can do most of step 1, all of step 2, and most all of step 4, but should leave the checkering and engraving to the professionals. All steps require expenditure of a certain amount of money, but these are spread out over a long period of time making it easier to financially support each step.

Significant differences will be found in the way custom gunsmithing is done in Europe as compared to the U.S. About three levels of operational methods are encountered in Europe. These range from the custom shops operated by the big corporations down through the Organized Guild type of gun production to the individual custom gunmaker much like the U.S. custom gunsmiths.

Most of the big European gunmaking houses have a custom gun shop or branch. These use the production parts, hardware, and machinery for the basic metal of receiver and barrels while the custom

shop adds the special wood and other embellishments to produce the customer specified firearm. Some companies produce only a few production models and concentrate primarily on custom or special order guns.

Ferlach, Austria is a good example of the Organized Guild type of custom gun production. Here we find a common foundry, machine shop for making barrels and receivers jointly owned and operated under the direction of several custom gunmakers. The central shop produces the basic metal parts, then each custom gunmaker adds his own personal touch and embellishments. Shotguns, rifles, combinations, and drillings are produced in this manner with each custom maker adding his own unique features and applying his special skills.

Independent custom gunmakers are frequently encountered in Europe. Most are master gunsmiths that have been trained by the guild system, which is so common on the Continent. These skilled custom builders buy their basic hardware, barrel(s) and receiver from one of the larger companies, then ply their expert skills without fanfare producing many classic guns having fine workmanship and exceptional elegance. German and Austrian artisans produce many of these fine firearms and are especially adept in choice and application of fine English walnut and exquisite engraving.

Apprenticeship in the guild is the most common form of gunsmith education and application of hands-on training. Much of the rough early work on a gun is done by the apprentice, leaving the detailed precision fitting tasks to the master custom gunmaker and credited artisan. In order to qualify for a Master's rating in the Guild, an apprentice must build a complete gun from scratch, do all the embellishment, regulate the barrels, and then pass a critique of his peers in evaluation of the work.

By and large the European custom gunmaker is more fastidious and more highly skilled than his U.S. counterpart, due mostly to the pride of the Old World craftsmanship and inherent patience. But the two compete for different trade—European masters mainly in shotguns and live-bird guns—Americans in hunting rifles and specialized shooting such as trap, target, and silhouette shooting.

CHAPTER VII

CRITERIA FOR BLANK SELECTION

When choosing your blank, make sure it is of sufficient size, thickness, and shape to accommodate your stock styles and design. The thumbhole styles require the widest and thickest wood, while the classic stock, without a cheekpiece, can be cut from the thinnest blank and with a most narrow butt end. If an offset is required for a rifle stock, the blank must also have an added thickness to fulfill this requirement and should the rifle stock require more drop at the heel than normal, you must make sure it has a wider butt section to comply with this request.

Whether selecting a blank to stock a gun you are anticipating to order from a custom gunmaker or to replace the stock on your favorite gun, there are countless factors that must be considered. This chapter will attempt to address as many of these as practical and steer you on a course to avoid problems now, and in the future, when that special gun is in use. Most discussions and remarks are not directed toward any specific wood, with a rare exception for a citation of a specific species to emphasize a point or where that wood has unique or peculiar characteristics.

A wood to be used for a gunstock must be capable of holding the action in place during recoil, sometimes for thousands of shots. A wood that splits easily cannot withstand heavy recoil or does not retain its stability is of little or no use as a gunstock wood. Long ago gunmakers learned the most desirable and suitable wood for gun building was walnut, because it embodies the combinations of strength, weight, and stability that is unequaled by few other woods and excelled by none in beauty and utility.

A wood must have certain physical properties, as well as a pleasing appearance, to be a satisfactory material. The discussions that follow detail the major physical properties of wood in general that are of interest to the stockmaker and addresses some of the related performance characteristics desired.

HARDNESS — The hardness of a timber varies from tree-to-tree of the same species and different sections within the same tree. In general a heavier wood is also a harder wood, but there are exceptions where the fiber structure, along with the way the cell capillary vessels are

arranged, such to have a dense wood but not as heavy as one having different fiber structure. Hardness is determined by the force, in pounds, required to imbed a .444" diameter steel ball ½ its depth in the cross grain direction of the sample. The ability to checker a wood is almost directly related to the hardness of the wood and probably the most important physical wood characteristic to the stockmaker. Softer woods will not take fine checkering, in the normal sense, at all; while good hard woods like English walnut can be checkered with sharp tools up to 32 lines per inch. Most American black walnut is checkered at 18-22 lines to obtain good results. The finer the checkering the more treasured the work, as in the case of finer scroll engraving. Since hardness is not the absolute criteria of fine checkering, as some hardwoods refuse to accept fine-line cuts, now and then a softer wood can be successfully decorated with perfect fine-line checkering. So to assure the ability of the stock to be checkered correctly, small pieces of the blank, preferably in the grip and forearm area, should be reserved to provide a sample for checkering tests to ascertain the ideal pattern and maximum lines-per-inch (lpi) of checkering fineness.

SHOCK RESISTANCE — Resistance to shock or shock rating, more accurately the work-to-maximum-load rating, is the ability of a wood to withstand a sudden impact and is one of the most important physical properties in selecting a gunstock blank for a heavy recoil rifle. Big caliber rifles require a wood that will withstand repeated heavy recoil from firing heavy bullets with a relatively light gun. If the shock resistance value is too low, and/or satisfactory modifications not made to the stock, failure will soon occur in the form of a split, crack, or crushed wood making the stock useless for the firearm. Hardness plays a role in shock resistance, generally the harder the wood the higher the shock rating, but to be sure always consult the numerical data furnished to determine the proper value since inconsistencies do occur in the hardness/shock rating relationship.

WEIGHT — Actual weight of dry wood of a particular species will vary greatly from tree to tree and place in the tree where the blank is cut. The numerical value given with each wood listing is an average of a suitable number of dry samples. Wood weight has a direct bearing on the weight of the finished gun, being on the average, about 30-45% of the total as shown below:

Wood	Weight	Stock	Gun Total	% Tot.
Ebony	73 #/cu.ft.	4# 12oz.	10# 4oz.	46
Mesquite	54 #/cu.ft.	3# 8oz.	9#	40

Wood	Weight	Stock	Gun Total	% Tot.
Am. black walnut	38 #/cu.ft.	2# 8oz.	8#	31
Black cherry	35 #/cu.ft.	2# 5oz.	7# 13oz.	29

A comparison of these woods and the resulting stock weight gives valuable insight into the resulting rifle weight. This shows that unless special mods are done, the heavier the wood, the heavier the stock and gun. A heavier gun results in less 'felt' recoil, but as an Old Timer points out, "You gotta carry the gun a lot more than shoot it." So a little recoil on the rare occasions is not too much to be concerned about in a hunting rifle or a field shotgun compared to a gun that weighs a ton at the end of a hunting day.

STABILITY — Stability in gunstock blanks is the ability of the dry wood to withstand changes in atmospheric conditions without significant warpage. The volumetric shrinkage of a wood can be used as a judgmental factor in consideration of a stability rating of a stockwood. Judgmental because the data given in the tables is the shrinkage from green to dry and this shrinkage rate more than likely will change once the wood is dry and becomes less hydroscopic. As shown earlier, wood reabsorbs moisture at a slower rate than it was expelled during the drying process. From this it is reasonable to assume that it will expand or contract less with a change in moisture after it is dry than in drying. Comparative use, more or less, of the VS values are therefore suggested instead of direct usage, i.e., if the VS value of one wood is 10% and another 5% the second will just move less, not ½ the first, just less. Moisture changes in the wood, which causes shrinkage or expansion, is normally more troublesome than temperature changes even though temperature distortion needs to be considered. A good seal of the pores of the wood will alleviate some of both problems. That is why it is so important to achieve the best possible seal at the time of finishing. If you live in a moist climate, like Florida, and plan to hunt in a dry area, like Colorado, be sure you select a wood with a low percentage of volumetric shrinkage; make sure it is 'bone' dry when it is worked and thoroughly and deeply sealed when it is finished.

SHEAR STRENGTH — The last numerical value given for each wood is the ability of the wood to take loads parallel to the direction of the grain. In the case of gunstock usage, this property is of secondary importance, but it has some indirect relationship to the shock resistance rating of the wood. The numerical shear values given are

based on straight grained samples of the species and will normally be much greater for a wood having figure or grain swirl. Woods with interwoven or interlocking grain will have a higher shear value than a straight-grained wood.

MACHINABILITY — This is another property of wood, commonly discussed, that allows planning, shaping, boring, carving, and turning with ease and without losses of material due to structural fracturing or chipping of the wood. This property has more to do with the economics of stock production than performance, but is something that needs to be taken into account. There are three relative levels of machinability ratings used, EASY—MODERATE—DIFFICULT. These are rated on straight grained samples and have little meaning relative to custom stock making especially when the work is most often done on a duplicator machine using highly figured fancy wood blanks.

* * *

When choosing a blank, one criteria you should consider is how the blank was cut from the original log. As discussed earlier, the two most common methods of sawing produces the quarter sawed blank or the

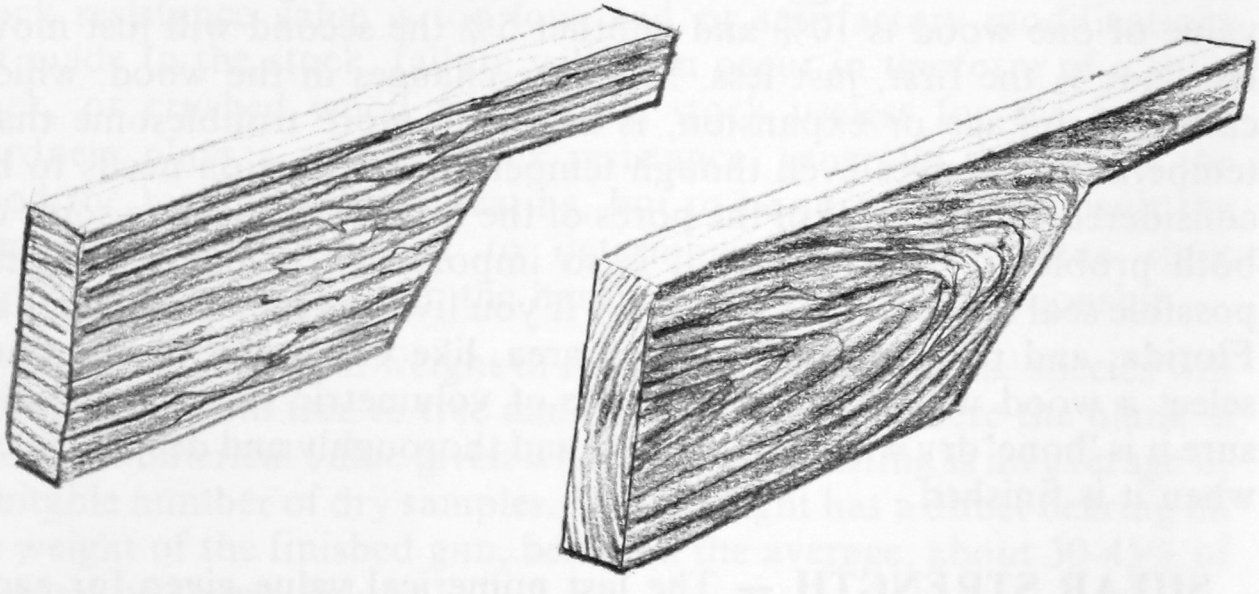


Figure 43. A Quarter Sawed Blank on the Left With a Slab Sawed Blank on the Right

slab sawed blank. Figure 43 shows a sketch of an ideal straight-grained wood with recognition clues to tell the difference. Note that the end grain pattern runs horizontal on the quarter sawed blank while it is curved and runs near vertical in the one that is slab sawed. Also on the flat side of the quarter sawed blank the grain runs parallel to the top while on the slab sawed unit the grain makes the parabolic pattern described earlier.

Highly figured fancy woods, cut from the crotch or stump areas, are often difficult to determine the method of cut since the grain runs in so many different directions, but careful study of both ends of the blank will usually lead one to reach a final conclusion, if it is important. At least two blanks of all slab cut logs are always quarter sawed blanks. That is probably the reason many cutters and saw mills slab saw all the small logs (14″ to 39″ in dia.), since much of the log becomes lumber, decorator slabs, and furniture blocks. Both methods of sawing have independent and special characteristics, each of which have a bearing on what type of gun the blank is being selected to build.

Slab sawed blanks, as a rule, show more apparent color and figure since the parabolic pattern of the grain endings are visible to the eye. But the slab sawed rifle blank, if the grain alignment is not perfect, will have a greater tendency to warp laterally, right or left, changing the bullet point-of-impact significantly. How much this change will be depends on how much the forend warps and how far it forces the barrel out of initial alignment. (This is one of the good arguments for free-floating the rifle barrel.) One disadvantage of the slab cut is that this cut has a tendency to display one-sided figure and color.

Quarter sawed blanks, while displaying more uniform figure and color pattern, side-to-side, will have a tendency to warp in the vertical plane, up or down, if the grain flow is not correct in the forearm area. This effect is not as pronounced since this slight change, increase or decrease, on the forend pressure point of the stock will not produce as much change in the hunting rifle point of impact. Quarter sawed blanks will usually withstand higher recoil since the direction of grain orientation increases the shock resistance capability of the wood.

Your final choice between a quarter or slab sawed blank will depend more on the type of gun than the sawing method. Beauty of the wood and grain flow will most likely control your choice and most fancy figured wood, especially a two piece blank, is difficult to discern the difference in looks and results.

The flow charts that follow in figures 44 and 45 and the tables at the end of the chapter will assist you in selecting a blank for almost any custom gun. Note that some gun types or categories have very limited

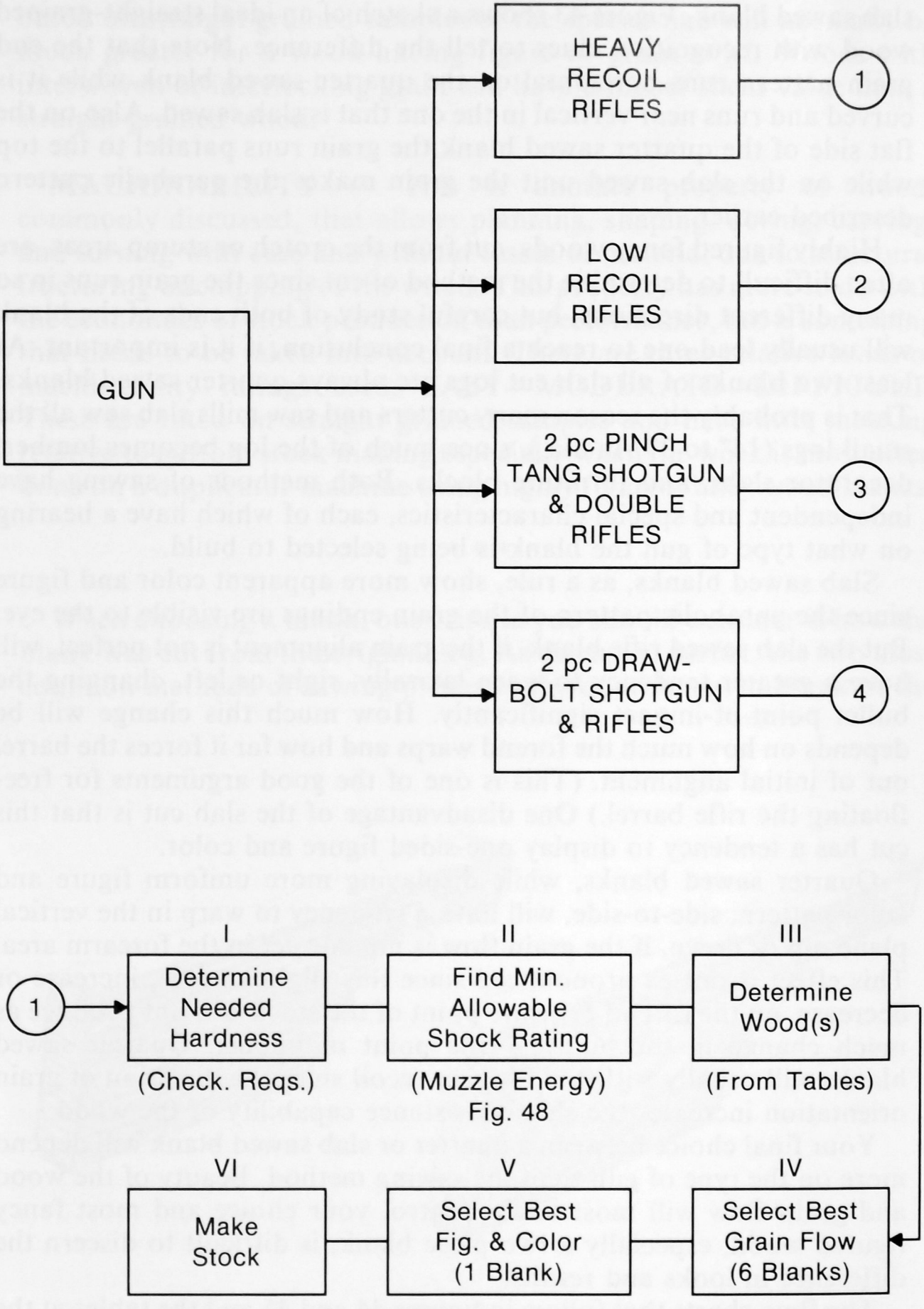


Figure 44. Flow Chart For Blank Selection

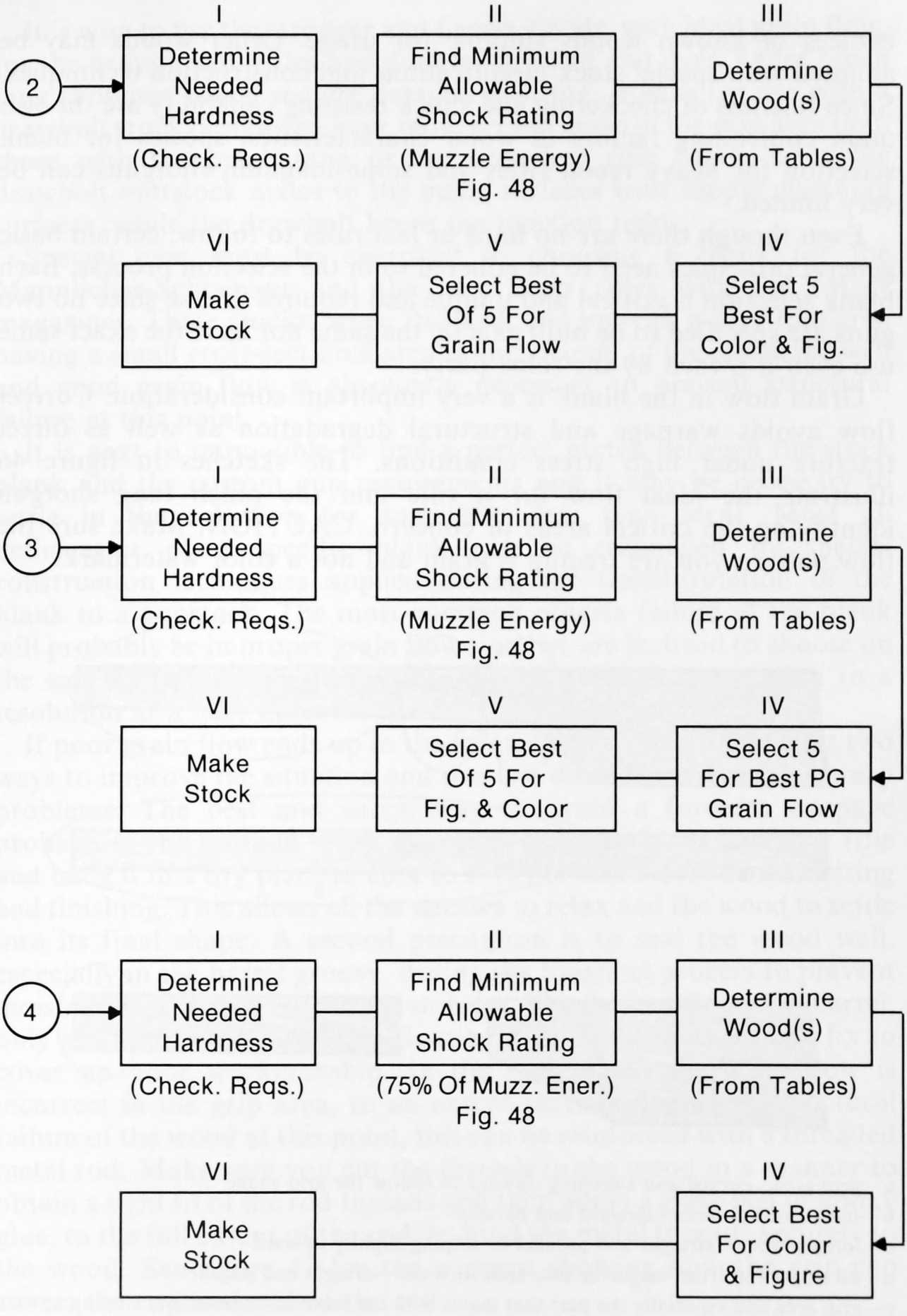
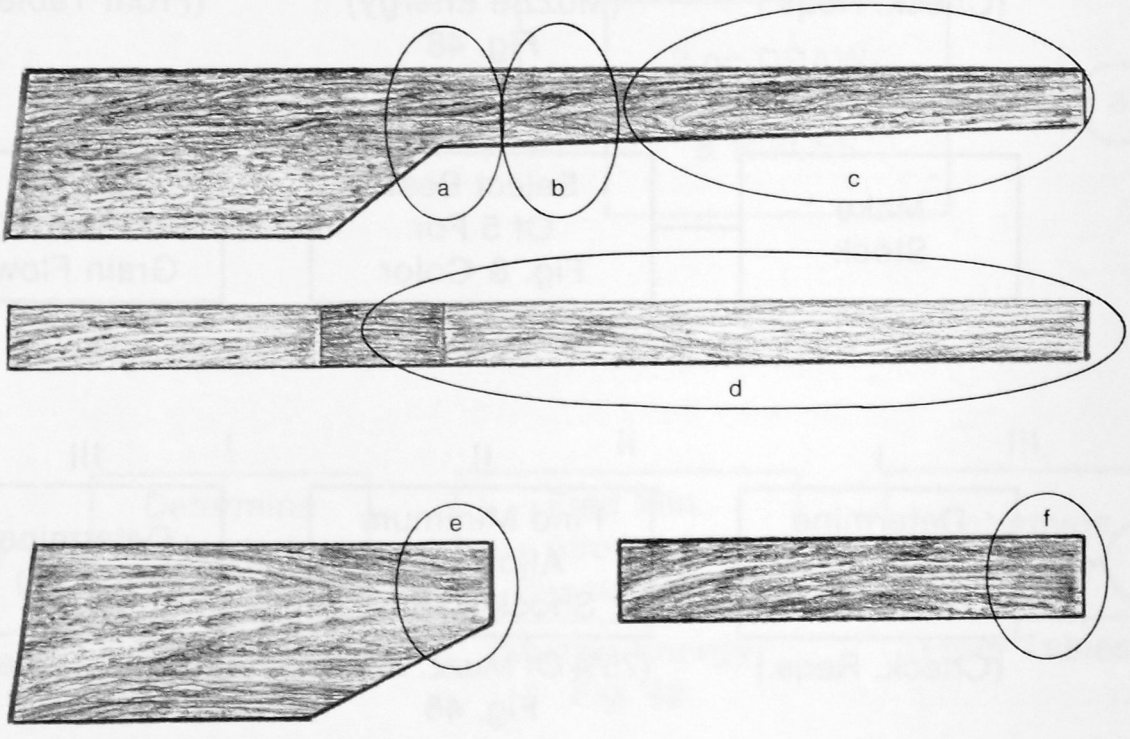


Figure 45. Flow Chart For Blank Selection

choices of known woods suitable for usage. Other woods may be adapted with special stock modifications and construction techniques. Since fineness of checkering and shock resisting capability are the two main controlling factors in wood characteristics, species for blank selection for heavy recoil rifles and some magnum shotguns can be very limited.

Even though there are no hard or fast rules to follow, certain basic general principles need to be adhered to in the selection process. Each blank selection is critical and unique and requires finesse since no two guns are specified to be built exactly the same nor have the exact same use even if owned by the same party.

Grain flow in the blank is a very important consideration. Correct flow avoids warpage and structural degradation as well as direct fracture under high stress conditions. The sketches in figure 46 illustrate the ideal flow for a rifle and the pinch tang shotgun identifying the critical areas of concern. CAUTION: Make sure the flow pattern you are tracing is grain and not a color watermark.



a—grip area—curved and sweeping upward to follow the grip shape
b—magazine box area—straight and parallel
c—forearm area—straight and parallel or sloping slightly upward
d—all upper top from magazine box area forward—straight and parallel
e—grip area and especially the part that mates with the receiver—curved and sloping upward
f—top side of grip area—straight and parallel

Figure 46. Grain Flow for Blank Selection

It is wise to use the stronger and firmer woods, with ideal grain flow, for the heavy recoil rifles and double barrelled and over/under pinch tang shotguns which require detailed inletting. Blanks for use with a drawbolt stock design can have more erratic grain in the grip area than those with the pinch tang or the one-piece rifle blank, since the drawbolt buttstock mates to the metal surfaces with simple matching surfaces, while the drawbolt keeps the junction tight.

Special care must be exercised in choosing a blank for the Mannlicher-Schoenaur and the new Steyr rifles with the rotary magazines. These stocks, when finished, end up with a very thin area having a small cross-sectional area in the vicinity of the magazine well and good grain flow is absolutely necessary to prevent structural failure at this point.

It is next to impossible to find a perfect match between the stock blank and the custom gun requirements and it may be necessary to settle in the selection for something less than ideal. Most all deficiencies of a specific blank can be reconciled by special construction techniques applied during the transformation of the blank to a gunstock. The most common criteria failure of the blank will probably be improper grain flow since we are inclined to choose on the side of figure and beauty leaving the grain flow question to a resolution at a later date.

If poor grain flow ends up in the forearm area there are at least two ways to improve the situation and one last ditch fix to avoid accuracy problems. The best and surest way to avoid a forearm warpage problem in the finished stock is to semi-inlet the blank for your rifle and hang it in a dry place to cure to 6-12 months before final inletting and finishing. This allows all the stresses to relax and the wood to settle into its final shape. A second precaution is to seal the wood well, especially in the barrel groove, during the finishing process to prevent moisture intake during use or storage. Finally free-float the barrel, only as a last resort, since free-floating is often taken as a quick fix to cover up poor workmanship. In the case where the grain flow is incorrect in the grip area, to an extent there is danger of structural failure of the wood at this point, this can be reinforced with a threaded metal rod. Make sure you cut the threads in the wood in a manner to obtain a tight fit of the rod threads and then apply a glass-bed or epoxy glue, to the full extent of the rod, to bind the metal threads securely to the wood. See figure 47 for the concept showing how the grip cap covers the exposed end of the rod.

If the grain flow problem is in the magazine area of the blank this section can be reinforced with fiberglass or bedding compound to give

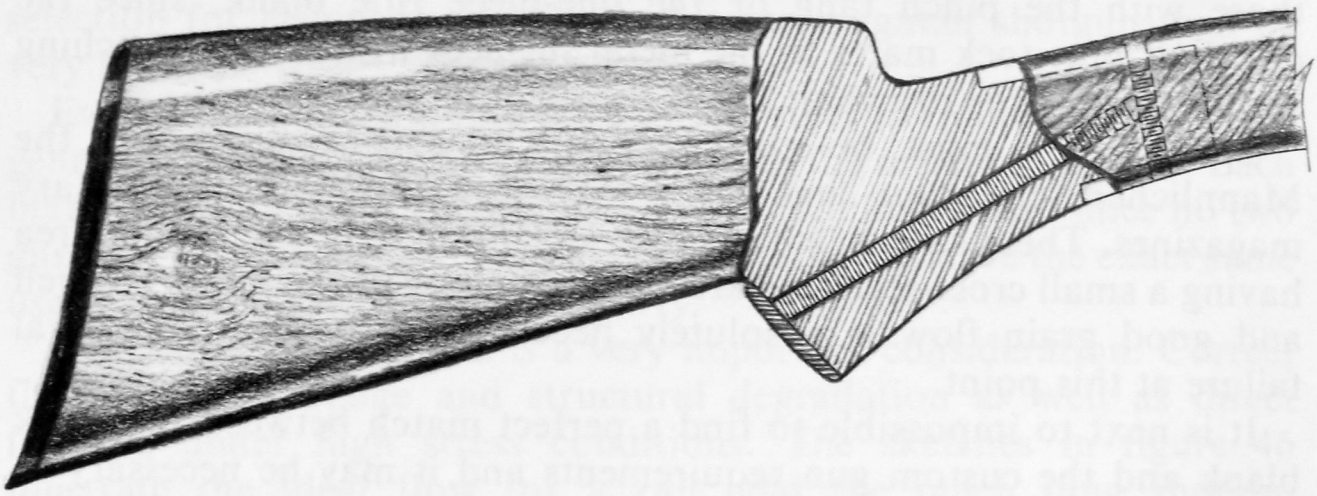


Figure 47. Reinforcement of Grip Area for Poor Grain Flow

some added strength to the finished stock. Even though this section of the stock does not require the strength of the grip area, only limited improvement can be expected; so if your barrelled action causes a thin cross-sectional area at this point in your stock design, be very cautious about the grain flow in this area.

Should you end up with a blank that is not as hard as desired, there are two problems you face. Soft wood may cause the blank to fail the recoil criteria (SR value) and the checkering will have to be simpler and of a coarser texture. A small sample of your blank should be saved for a checkering test to ascertain the maximum lines per inch that piece of wood will withstand. Once the checkering texture has been determined, the type of pattern can be selected in conjunction with the artisan doing your work and the checkering begun.

In certain cases your blank will fail to fulfill the SR requirements for a heavy recoil rifle. From the flow charts and figure 48 it is apparent that only a few woods satisfy these requirements, so it may be necessary to supplement the strength of your chosen blank. Three construction techniques are available and one or all will allow use of a below criteria piece of wood to satisfy the recoil requirement. A good glass bedding job at the recoil lug, back of the magazine box on the trigger guard, and the receiver tang area will add sufficient strength to reinforce most stocks and increase the shock rating 15-20%. Metal crossbolts at the recoil lug on the Mauser 98 type of action, or just

forward of the magazine area for other action types, and one aft of the magazine well to absorb recoil and prevent splitting of the wood by forces on the receiver tang and tang screw. These crossbolts are often found on the Browning and other European rifles which have satisfactory wood but have added these for looks, safety, and insurance, maybe unnecessarily. A third technique to help solve the recoil problem with a wood having an SR value too low is to add an extra recoil lug. This is usually added to the straight section of the barrel 1½ to 2″ ahead of the barrel/receiver union. Attachment with silver solder is the preferred way since TIG or heliarc welding could degrade the barrel accuracy. If properly installed this lug will be completely hidden from view. This method is also used by Browning on some of their heavy recoil rifles, again more as a safety factor than a real requirement. A properly designed and constructed stock of correct wood should never need these added reinforcements. Two-piece blanks, like those used on the Ruger #1 or a shotgun having a drawbolt, can tolerate an SR value up to 15% less than the recommended value. Glass bedding is suggested at the junction of the receiver and the buttstock on all shotguns, double rifles, and two-piece rifle stocks to obtain a more intimate contact between wood and metal.

When your choice ends up with a heavy/dense wood, the stock can be lightened to end up with the same weight as a standard weight wood. This can be done after the final shape and inletting is complete by boring out and cutting away wood in places not visible or where strength is not impaired. About the only precaution, except for preservation of structural strength, is to retain a semblance of balance in the stock so the gun will have reasonable balance and weight distribution to allow proper shouldering and pointing.

Some blanks have minor cracks, season checks, and internal flaws. These may appear detrimental and if they remain after the stock has taken its final shape, most are easily filled in the finishing process. In fact these often add some contrast in color and figure to increase the stock beauty and appearance. The only cracks or flaws to be concerned about are those that result in a structural strength degradation in the final shaped stock. Any blank with a wood flaw or crack, that will obviously remain after final stock shaping, in the magazine box, rear tang, or rear trigger guard area, should be rejected at the onset.

With the information and technical data available it is now possible to select a proper wood for any custom gun. By taking a systematic and logical approach to the selection, and knowing a bit of technical data on the rifle to be stocked, a wood can be chosen. Since the hardness of the wood generally controls the ability to properly checker the wood, it

is best to choose a species of wood that will satisfy the checkering requirements first. If no checkering is needed or desired, or the stock is to be carved for decoration, this criteria may be bypassed. If checkering is required, a wood with a hardness of at least 950 pounds will be satisfactory for 16 lpi. Finer checkering, say 26 lpi is limited to woods with hardness values of 1100 or greater. Review of the hardness section of the table at the end of this chapter, where the woods are listed in descending order of hardness, will allow you to draw a mental line at the lowest acceptable hardness limit. All woods above this line will be satisfactory for your stock.

Next it is necessary to find the species of woods that will satisfy the shock resistance requirement. If expected recoil of the proposed rifle is substantial, say anything greater than the 308 caliber or equivalent, species of woods having SR values greater than about 8.5 must be selected. To be more analytical, use of the curve in figure 48 is suggested. From a ballistics table find the highest value of muzzle energy listed for that caliber of rifle to be stocked. Enter the graph on the vertical axis at this muzzle energy value and follow a line parallel to the horizontal axis until it intersects the curve. At this point drop a vertical line to the horizontal axis to determine the SR value needed. All SR values to the right are acceptable for the stock. From the shock rating section of the table at the end of this chapter find the woods suitable for use in the same manner used to determine hardness.

Weight of an acceptable wood is next and is a fairly easy task if the rifle is planned for field use. If a target or bench-rest rifle is planned, weight will probably be unimportant. From the weight section of the table find the species having a weight range of 35-45 pounds per cubic foot.

With these three choices complete we have now limited the number of woods that are satisfactory for this custom gunstock. All that is left to do is find the right blank with proper grain flow, color, and figure for the intended purpose of the custom gun.

An example, using the 300 Win. magnum as a hunting rifle with 26 lpi checkering, is shown. This example ends up with the following woods for final selection.

American black walnut	koa
Bastogne walnut	Pacific yew
beech	sugar maple
English walnut	tanoak
honey locust	white ash

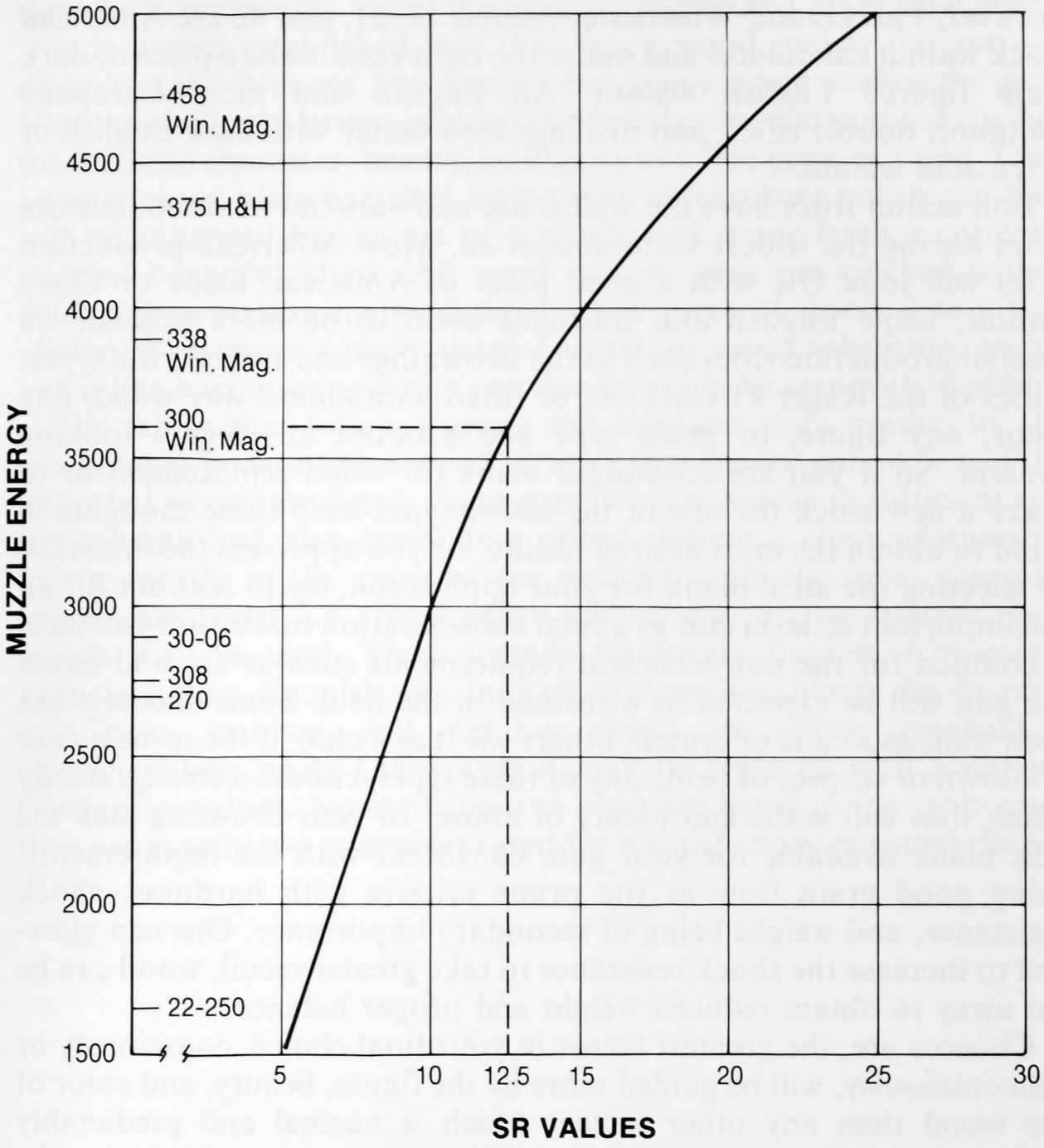


Figure 48. Curve for Selection of SR Value With a Known Muzzle Energy

Since a dark wood is needed, only six of these remain for blank selection—American black walnut, Bastogne walnut, English walnut, koa, Pacific yew, and tanoak. Other woods are possible, if dense dark colored blanks are available, but these six should allow a sufficient cross-section for the selection.

Certain guns have preferred woods. For example the Browning O/U shotguns need Bastogne, English, or in some rare cases a light colored wood, like maple or light colored myrtle. The L.C. Smith, Fox,

LeFever, Parker, and Winchester models 12, 21, and 42 are American black walnut candidates and under the right conditions a piece of dark plain figured English walnut. All English and most European shotguns, double rifles, and drillings look better with dark English or Circassian walnut.

Bolt action rifles have the widest use and varieties of wood, custom rifles having the widest variations of all. Most American production rifles will look OK with a good piece of American black or Claro walnut, while English and Bastogne seem to be more popular on foreign production rifles such as the Brownings and similar rifle types. Rifles of the Ruger #1 class can be fitted with almost any wood, any color, any figure, or grain type and produce an elegant looking firearm. So if you are selecting a blank for wood replacement or to make a new stock for one of the above types keep these thoughts in mind to obtain the most desired results. As you approach the final task of selecting the ideal blank for your application, try to account for all the important criteria and as a final consideration make sure you have accounted for the non-technical requirements such as use and abuse the gun will be expected to withstand in the field. Some shooters use their guns as a cane or crutch; others use it as a club; if the to-be owner is known or suspect of being any of these types, choose a strong, sturdy blank that will withstand plenty of abuse. In your choosing pick the best blank available for your gun, consistent with the requirements, using good grain flow as the prime criteria with hardness, shock resistance, and weight being of secondary importance. One can glass-bed to increase the shock resistance to take greater recoil; wood can be cut away to obtain reduced weight and proper balance.

Chances are, the greatest factor in your final choice, consciously or subconsciously, will be guided more by the figure, beauty, and color of the wood than any other factor, which is normal and predictably expected. Imagine the situation you could be presented with during the final selection process, where your wood vendor has shown you the most highly figured seductively colored piece of English walnut you have ever laid your eyes on. It is honey amber with a maze of tight jet black marbling streaks throughout. At the same time you are sizing up a piece of Bastogne walnut as fine-textured as ivory, heavy as hard maple, and as hard and dry as bone. It is rich and variegated with streaks of black, gold, ocher, and amber. One quick mental review of your financial status tells you that you can't really afford either blank, but your craving and compelling desire for such fine pieces of wood tells you that one of those blanks has to be yours. But since you can't decide on which one, your mental response is, "What the heck, I'll take

them both and worry about the money, layout, and grain flow later."

It is a well established fact that fancy wood makes the gun—It doesn't make it shoot any better—but fancy wood makes the gun. Nothing else looks better, nothing else feels better, and nothing else has the intrinsic character, beauty, or dignity of a fine piece of wood. Even an unadorned plain barrelled action with an excellent polish and blue will be enhanced by the use of a good stock made from a correctly selected beautiful blank. All good custom guns are stocked with a deluxe presentation highly figured fancy piece of wood. For a true aficionado to have a plain piece of wood, or wood substitute, on his gun is like having an ugly wife you don't want to be seen with in public.

The tables that follow provide the available data needed by the stockmaker in choosing a wood to stock that special gun. A few of the imported woods are listed, those commonly available in sufficient size for a blank and also reasonably priced. Where a close relationship exists, mostly in the cases of the walnuts, only the most common species are listed; i.e., for English walnut any of the *Juglans regia* woods may be used. These include California English, Circassian, French, Italian, Spanish, etc. In place of American black, the Arizona or Texas walnuts will exhibit about the same mechanical characteristics; while Claro walnut may be replaced with Southern California walnut. None of the true oaks are listed in the table since they are mostly too coarse-textured for a satisfactory gunstock finish.

Osage-Orange	2500
Screwbean mesquite	2335
Persimmon	2300
Dogwood	2150
Hop hornbeam	1860
Pecan	1820
Shagbark hickory	(1820)
Hornbeam	1780
Apple	1730
Almond	(1700)
Black locust	1700
Honey locust	1580
Witch hazel	1530
Orientalwood	(1480)
Bastogne walnut	1460
Madrone	1460
Rosewood	1450
Sugar maple	1450
Cuban mahogany	1430
Tanoak	1400
African mahogany	1350
White ash	1320
Beech	1300
Myrtle	1270
Yellow birch	1260
English walnut	1200
Green ash	1200
Pacific yew	1150
Koa	1110
Cascara	1040
Southern magnolia	1020
American black walnut	1010
Claro walnut	(950)
Black cherry	950
Imbuya	950
Sourwood	940
Eastern red cedar	900
Hackberry	880
Longleaf pine	875
Rock elm	860
Slippery elm	860
Bigleaf maple	850
Black ash	850
Tropical American mah.	845
American elm	830
Western larch	830
Red lauan	825
Sycamore	770
Silver maple	700
White Lauan	690
Sassafras	630
Tamarack	590
Northern catalpa	550
American chestnut	540
Yellow poplar	540
Bald cypress	510
Butternut	490
Redwood	480
Black willow	(420)
Basswood	410
Yellow buckeye	350
Aspen	350

SHOCK RATING

Osage-Orange	(30)	Black cherry	11.4
Hornbeam	(37)	Koa	(11)
Shagbark hickory	25.8	American black walnut	10.7
Apple	23.0	Orientalwood	(10)
Dogwood	22.0	English walnut	9.8
Yellow birch	20.8	Northern catalpa	9.6
Pacific yew	20.2	Red lauan	(9.4)
Black locust	18.4	Claro walnut	9.0
Almond	(18)	Madrone	8.8
Tanoak	17.9	Black willow	8.8
White ash	17.6	Yellow poplar	8.8
Rock elm	16.9	Sassafras	8.7
Slippery elm	16.9	Sycamore	8.5
Sugar maple	16.5	Tropical American mah.	8.5
Persimmon	15.4	Silver maple	8.3
Beech	15.1	Eastern red cedar	8.3
Screwbean mesquite	(15) *	Bald cypress	8.2
Witch hazel	15.0	Butternut	8.2
Black ash	14.9	Myrtle	8.2
Hop hornbeam	14.0	Sourwood	(8)
Pecan	13.8	Cuban mahogany	(7.9)
Hackberry	13.5	White lauan	(7.9)
Green ash	13.4	Bigleaf maple	7.8
Honey locust	13.3	Imbuya	7.7
Rosewood	13.1	Basswood	7.2
American elm	13.0	Tamarack	7.1
Southern magnolia	12.8	Redwood	6.9
Western larch	12.6	African walnut	(6.6)
Black maple	12.5	American chestnut	6.5
Bastogne walnut	(12.3)	African mahogany	(6.4)
Sweet gum	11.9	Cascara	6.1
Longleaf pine	11.8	Yellow buckeye	5.9

*Screwbean mesquite has been listed at this level since the published data is questionable and the SR value is certain to be this value or greater.

Shagbark hickory 63
Osage-Orange 55
Screwbean mesquite 54
Persimmon 53
Rosewood 53
Hop hornbeam 52
Dogwood 51
Hornbeam 49
Tanoak 48
Pecan 48
Black locust 48
Apple 46
African mahogany 46
Beech 45
Honey locust 44
Sugar maple 44
Madrone 44
Rock elm 44
Black maple 43
Pacific yew 43
Slippery elm 43
Witch hazel 43
Yellow birch 43
Almond 42
Bastogne walnut 42
Orientalwood 42
Red lauan 42
White ash 42
Cuban mahogany 41
English walnut 40
Imbuya 40
Green ash 40
Myrtle 39
Tamarack 39
American black walnut 38
Longleaf pine 38
Sourwood 38
Hackberry 37
Koa 37
Sweet gum 37
Western larch 37
White lauan 36
Cascara 36
Claro walnut 35
Southern magnolia 35
Sycamore 35
Black ash 35
African walnut 34
Silver maple 34
American elm 34
Bigleaf maple 34
Black cherry 33
Eastern red cedar 33
Sassafras 32
Tropical American mah. 32
American chestnut 30
Bald cypress 28
Butternut 27
Black willow 26
Basswood 26
Yellow poplar 26
Northern catalpa 26
Yellow buckeye 25
Redwood 24

CHAPTER VIII

FROM BLANK TO FINISHED GUNSTOCK

Now that you have selected a blank, how does it get transformed into a gunstock? The professional stockmakers are familiar with this process, so much of the information that follows is for the novice or beginning stockmaker.

For the first time out stockmaker it all depends on the intent or extent of your stock making plans. Is this the first of a series of lifelong works or a one-time need? If the intent is more than a one-time need, it is recommended that you arrange to attend the stockmaking course at one of the many fine gunsmithing schools throughout the country, such as Trinidad State Junior College in Trinidad, Colorado. Courses in stockmaking in these gunsmithing colleges will take roughly six weeks to complete, and most all will start the student off with a blank, barrelled action and the tools necessary to 'carve a stock from the block' like the old timers did before the duplicator was applied to the gunstock trade. As a student you will be required to do all the tasks and operations necessary from layout, through inletting the barrelled action, to application of the final finish on the wood to prepare it for mating to the metal, and readying the gun to shoot. Many of the hand tools, chisels, and scrapers needed for the final inletting will be handmade in the course of the hands-on training.

If you find it impossible to schedule the time for this college work, then the next best thing is to attend one of the seminars taught each summer. These are primarily brush-up courses for the practicing craftsman who wants to hone his skills or expand his expertise. These seminars are not only economical, but they are very enlightening, cover all the basic principles, in broad terms, and allow the student to perform almost any stocking project of his selection as long as it can be essentially completed during the period of the seminar.

If your lifestyle, finances or other committments will not allow you to accomplish either of the above, the last possibility is self teaching of the total process. There are many good books and articles written on the subject and with due patience, practice, and research these will lead you through all the steps necessary to complete the layout, inletting, and final shaping of a gunstock. One of the most useful and readily available write-ups is shown in a section of "The NRA Gunsmithing Guide" published in 1982. This article shows how Keith Stegall goes

through all the necessary steps to make a gunstock from a blank. If followed carefully, this would lead a beginner to a completed stock. Care must be exercised to make sure all the steps are there to accomplish your project. If any part of the procedure appears to be missing, the proper steps and processes must be determined to complete your job.

Most beginners should start their first stock project using a semi-inletted blank obtained from one of the suppliers like Fajen, Bishop, or Roberts. This provides the novice with a 90% completed stock with all the critical and crucial dimensions cut and holes drilled, places where the beginner can and will make mistakes the first few times around. This does leave most of the time consuming tasks and tedious work to be done; but these are the time consuming operations that take up the valuable time of the custom stockmaker and cause the stock costs to elevate. Most of the time to build a gunstock is spent in the final inletting, sealing, and finishing. All of this work can be done by the home craftsman if you will take the time, effort, and patience to search out the information and develop the 'how-to' knowledge and required expertise. You can apply these principles along with some genuine Yankee ingenuity, some elbow grease, sweat, and a few tears to create a piece of woodwork worthy of your pride and praise of friends. Some home hobbyists do quite acceptable work and can be justly proud, even though they cannot yet rank up with the masters. So if you are handy with tools, have the patience, spare time, and would be content with the standard semi-inletted stock patterns from Bishop or Fajen, it is possible for you to produce a respectable gunstock. It may not measure up to the job of a 'Pro', but his first attempt was probably very little better. Your work may not match the results of a stock cut-from-the-block and inletted with the precision of a master, but it at least is something better than before. If you are not the crafts type or are short on time, in these cases you must somehow be able to accept the weakness of your own work and 'farm' some aspects of the stock work out to a professional smith. The only operation not recommended for the novice to attempt is checkering, pay a pro to do it and you'll be glad you did.

A correct layout, inletting, and finishing can mean the difference between a mediocre stocking job and outstanding results—the difference between A FINE STOCK and just a gun handle. Layout, a step provided when the semi-inletted stock is used, is important not only to obtain proper grain flow but also to utilize the best areas of the blank to show the most color and prettiest figure. Remember that along with the layout, the more curves and contoured surfaces you

have in the stock design, the better chance you have in displaying the color and figure of the wood. It is important in the layout process to provide a balance of the pattern on the blank to assure ample wood for all needed stock elements, i.e., material for the cheekpiece, ample buttstock wood for proper trigger pull, pistol grip wood, and enough forearm material for the forearm pattern desired. You must also place the pattern on the blank in a manner to assure that no defects or obvious flaws are contained in the material that will end up as gunstock. Proper layout will allow defective areas to be cut away and discarded as scrap or put to use for purposes that require smaller pieces of wood.

Inletting, if properly done, is a slow, repetitive, and tedious necessary process, especially the final steps required to avoid any gaps and obtain a perfect wood to metal union. Inletting, in general, is a process of carving a cutout in the wood, exactly the shape and size of the action or barrelled action, so the metal is an exact fit to the wood. Good wood helps in this process. As any custom stockmaker will tell you *Juglans regia* walnut will fill, cut, and hold shape better than any other wood; others are almost as good, but none known today are better.

Final inletting will probably consume more than 50% of the total time required to complete the stock. A wide variety of chisels are first used, then specially shaped scrapers are employed to shape the wood to the action/barrelled action shape for an exact and precise fit—chisels to remove wood to get close to shape, then the scrapers to scrape away the minute layers of excess wood for the precision fit. For detailed step-by-step process and sequence of actions, see one of the many published articles or book sections. The NRA Guide, referenced earlier, will give you many of these details. If you plan a contrasting wood forearm tip for the stock, this is probably the best point in time for this installation so the barrel channel inletting can be completed. This would also be a good time to attach the grip cap decorator, if one is planned. Once a precision fit between metal and wood is obtained, and not before, can you consider the inletting task complete.

Should glass bedding be required or desired, this is probably the best point in the stock construction process to accomplish the task. There are only two reasons for glass bedding: 1) reinforcement of weak areas or 2) cover up mistakes. Either is acceptable for the novice and beginner, but only the first can be accepted from an Old Pro. Some glass bedding kits are considered better than others, but your choice will have to be made on the basis of need and purpose since there is not a great deal of difference in all the kits, except for the process of

procedure of use. Since some steps are time critical, you should understand each step before starting the job and you must follow the instructions exactly as given.

This is most likely the last point in the stock building process to install the butt plate or recoil pad. Some stockmakers, and for good reason, do the pad installation earlier in the process. Installation here allows the stock to be shaped to fair with the pad, or plate, before the final sanding and finishing is started. It is recommended that the wood underneath the pad be sealed against moisture. This may not be required, but for a little time and effort it will at least help keep the wood at the stock/pad union to retain its shape and the pad to remain faired with the wood.

Shaping the exterior is normally the next step in the process whether the stock was built 'from-the-block' or a semi-inlet. The main difference between these two is the amount of wood that needs to be cut away to fulfill the requirements of the customer. This point shows up one of the disadvantages of using the semi-inletted stock; the stockmaker is limited in the amount of custom shaping by the fact that most of the excess outside wood has been cut away in the semi-inletting process. Some inletting firms, if requested, will leave extra wood in places needed by the stockmaker to custom fit the stock to the requirements of his customer.

Now that the stock is shaped and completed in physical form, final finishing can be accomplished. Many excellent books and articles have been written on stock finishing and refinishing. Probably more articles, pages, and lines of print have been written on the various types of stock finishes and methods of finishing a stock than any other subject covered in the field of firearms and custom guns. This text will only 'thumb-nail' some methods and high-light other techniques. Newell (see references) is one of the best books on the subject of finishing and refinishing of a gunstock. He not only tells you how to use several types of finishes, he also gives you the formulae for the composition of a wide variety of sealers, finishes, and rubbing compounds.

The finish, on a wooden surface, serves several purposes. Other than adding appearance, the main object is one of being a barrier to prevent changes in moisture in the pores to avoid distortion of the finished product. Another is to serve as a vehicle to strengthen the surface fibers to avoid damage and, as well, prevent changes in the natural color of the wood. Any finish to be of great use and value must be durable, provide a good seal, and have character. Because if it cannot provide character, the finished stock, piece of furniture, or other product will be of little end value.

Finishing is the last act of labor and worship on the wood which has taken many hours to bring to this level of execution, and the results obtained will be the hallmark of quality of the stockmaker. Finishing can determine the public acceptance or rejection of his work. Many gun fanciers, and most casual observers, will judge the work by the results of his wood finish, rather than by the excellent wood to metal union on which his juried peers will judge, techniques he has strived so hard to perfect. A layman or novice will stroke and caress the surface of the finish and be quick to notice any minor imperfection, however small. This is why a stockmaker must develop a unique and superior technique of finishing.

There are two fundamental styles of finish (hand-rubbed and spray-on/brush-on), with three basic types of finishing materials (oil, lacquer/varnish, and plastic/synthetic). Most professionals agree that an oil finish is for beauty, while the synthetic (usually a urethane or acrylic), is more durable and the varnish/lacquer falls in between.

A properly applied hand-rubbed oil finish is surpassed by NONE as far as gunstock finishes are concerned. It is a time consuming, laborious task with long waiting periods between coats and rub-downs, requiring many hours of hard work. Even though it is not as highly hard-knock durable as the synthetic finish, the oil is easily repaired if damaged. On the other hand the urethane/acrylic is easier to apply—one or maybe two coats does the sealing, filling, and finish in 'one-feld-swoop'. But if the synthetic is damaged, either banged or nicked, the only suitable repair is to remove all the old finish (if it can be removed) and spray on a new coat. Whichever of these is chosen, the wood must be prepared for the finish. There are four basic steps or phases that are generally applied from this point to prepare the surface of the wood for final finishing. These are:

1—Sand smooth
2—Raise grain
3—Seal
4—Fill open pores

CAUTION: Some finishers suggest the use of steelwool at various stages of finishing a stock. This is unfortunate since the wool leaves metal particles embedded in the wood, which are left behind. These particles are difficult to remove and if left embedded are very detrimental to the looks of the final finish.

Final sanding is done using plenty of 'elbow grease' and 3 or 4 grades of succeedingly finer sandpaper begininng with 120 and ending with

400 or 600 wet-or-dry, depending on the type of wood. (Sand only the exterior; do not disturb the inletted areas.) Use sanding blocks to support the sandpaper in order to avoid dishing the flat surfaces. Sand with the grain whenever possible and continue with finer grades of paper to remove all scratches and the coarser sandpaper cuts. The surface must be sanded smooth to remove even the most minute scratch before any finish is applied.

To raise the grain, or 'dewhisker the wood', simply dampen the surface of the stock with a damp rag and then air-dry the surface or dry with an air blast, hair dryer, or hot plate. Sand the stock smooth with fine wet-or-dry paper and repeat the process as many times as necessary until no more whiskers are raised and a smooth scratch free surface is obtained. Even the slightest scratch on the surface of the wood will show through a finish.

At this juncture of stock construction, the majority of all custom stockmakers will follow the final sanding with the steps and processes needed to yield an oil finish. Many variations are encountered in the exact methods and use of materials employed, but the ultimate desired end result of a beautiful hand-rubbed oil finish is the same.

Final sanding is followed by application, with a brush or soft cloth, of the sealer coat(s). Sealing should be done with a good penetrating sealer that flows deep into the pores of the wood. Some highly figured and colored woods, like Claro walnut, should not be treated this way since time and chemical action can cause fading and dulling of its exotic colors. Seal all exterior surfaces and the inletted area (the grip cap and buttplate underside should have been sealed in earlier processes) so no moisture can be absorbed by the surfaces of the wood. Sealing underneath the buttplate is especially important because this is the area where the end grain gets the most exposure to moisture. This is generally where the gun rests in the storage position and this is also where the highest concentration of moisture is found when the gun is stood on the floor of a closet. Multiple coats of sealer may be required, depending on the sealer viscosity, and the wood. Use as many coats as necessary to make sure all surfaces are covered where moisture can enter. Moisture and lubricating oil are the greatest enemies of the stock wood; so it is important that all surfaces be deeply sealed, where wood mates with the receiver or action of the gun, that will be frequently lubricated. Glass bedding of these areas will give added protection. This not only will prevent absorption of moisture, but will help to prevent damage to the wood by oil used to lubricate the moving parts of the action. Lube oil will help keep your gun from rusting, but too much, with time and continued excess use, will cause the wood fibers

of the stock to deteriorate and become weak, especially in these stressed areas.

Figure in some woods, the maples for example, is enhanced by special processes that need to be applied at this stage in the transformation process. One common enhancement is a flame treatment, or scorching, of the grain ends of the curly and quilted figures. This is a tricky process where great care and special techniques must be employed to obtain the best results and not damage the stock. Some custom stockmakers apply unique stains to emphasize the figure in maple. These same staining techniques can be applied to other woods as well, especially a wood that needs to be darkened to satisfy a customer request.

A coarse or medium to moderately coarse-textured wood requires filling of the open pores. These open pores must be filled to the level of the surrounding surface in order to obtain a fine oil finish. Not all stockwoods need to be filled, but some of the walnuts and many of the other woods used take a much better finish if filled. This process can be accomplished with many materials and methods. But the most desirable and accepted method is to fill with the finish to be used for the outside coats. This is done by putting several heavy coats of the finish on the wood, then drying and cutting this finish back to the wood with fine sandpaper and repeating until all the open pores are completely filled. Usually one or two coats are sufficient and this procedure does not add false color or fake shades to the wood. Many types of filler are available on the market, two of which are clear and red tinted, that can be used if the need to fill in one coat, or enhancement of the wood color, is desired. Whatever type is used the filler must be cut back, with fine sandpaper, to the wood before any final finish is applied to the stock.

At last the point has been reached to apply the finish to that beautiful piece of wood. There are almost as many oil finish mixtures or 'concoctions' as there are custom stockmakers and first class woodworkers. A majority of these are brand named factory-mixed products and usually have a tung oil base. Some have a linseed oil or other natural oil base. Finishes with a tung oil base seems to be more moisture resistant than those with linseed or other oil bases. All are used in about the same manner. Apply—dry—smooth—apply—dry—smooth until the depth of finish and desired level of sheen and protection is achieved.

Some finishing techniques apply the next coat using fine wet/dry sandpaper saturated with the finish. This action performs the task of smoothing up the previous coat and application of the next coat

simultaneously. This coat is then wiped dry with a lint-free cloth and allowed to dry for the next coat. This is repeated, as necessary, until the desired finish is obtained.

Application of the lacquers and varnishes can either be by hand, brush or spray, with the most common application of lacquer by spray and that of varnish by brush. The most common use of the lacquer finish is in factory gun production. If a good finish is desired, the same steps, whisker, seal, fill need to be done. Sealing may not be too imperative if finish is applied by the spray method, since the lacquer/varnish will provide a satisfactory moisture seal of the wood. If properly done, a lacquer finish looks nice, but it is not as durable as the synthetic, and it is about as hard to repair.

The synthetic finish is sprayed directly on the wood, after completion of the dewhiskering, by use of a spray gun or aerosol type can. Depending on the type, one, or two coats at most, will be needed. This finish seals, fills, and finishes all at the same time and about the only precaution you need to take is to make sure that the coat is not so heavy that the finish 'runs' before drying. 'Runs' or other surface defects need to be sanded smooth and given a final sanding with extra fine paper (600 or finer). If a high gloss finish is requested, it is often necessary to touch-up these areas to achieve the proper gloss. There are many types of these finishes, most of them modern developments related to the paint industry. There are acrylics, phenolics, polyurethanes, urethanes, and vinyls with combinations and derivatives of these, all of which give a credible finish with the major difference being in the composition of the synthetic that is sprayed on the wood.

Three levels of final finish, as related to surface reflection, are common on finished stocks. These are high gloss, lustrous sheen, and matte, the degree of which is obtained by use of various levels of finishing, polishing, and rubbing with dulling compounds such as rotten-stone or fine valve-grinding compound. The more coats you apply, with finer and finer rub-down and polishing compound, gives a higher and higher gloss. You can obtain the dull matte or satin finish best by dulling, or scuffing, a gloss finish after it has been achieved. Several other compounds are available from the refinishing supply houses, and you will need to try several types and methods of applications to obtain the perfection you desire or your customers demand. The dulling process merely changes the light reflecting capability of the surface to give the desired decrease in gloss of the finish. You need to exercise care to dull the outer coat of the finish and not cut through to the wood. Most custom stockmakers try to obtain a

mid-range level, a deep lustrous sheen—not too glossy—not too dull. Apparent depth of the sheen is the important characteristic to achieve. Many stockmakers polish the final finish with a good furniture wax and at least one uses vaseline as a final polish.

Checkering and carving of the gunstock is an intricate, artistic, and specialized job. It takes many years of practice and patience to become proficient and competent. One of the better books on the subject is Monty Kennedy's treatise entitled "Checkering And Carving Of Gunstocks" (see references). This book gives you the big picture of the complete process including many factory original and artistic checkering patterns. Many of these are of a size and layout suitable for transfer and use.

Some woods are not adapted to fineline checkering while others cut with ease. Known deficiencies are identified in the description of the wood in Chapter IV. Some surprise trouble makers of note are screwbean mesquite, the soft maples, sycamore, and some of the elms. Poor checkering of a wood is the result of an adverse reaction of the fibrous elements to the cutting edge of the checkering tool. Generally, a wood with a high machinability rating will, with rare exceptions, checker and carve well. It is not always easy to find this rating and due to variations in hardness of the different woods, a sample test square of the blank is always advisable.

CHAPTER IX

SUBSTITUTE WOODS FOR WALNUT

American black walnut has always been plentiful and has been used extensively for a stockwood for many years. Cherry and other native U.S. hardwoods were employed by the early gunmakers because of the ready supply and inexpensive source. Walnut emerged as the prime gunstock wood and so many millions of rifles and shotguns have been stocked with it that many people scarcely realize that other woods are very satisfactory for the purpose. Walnut use is so widespread that it has become TRADITIONAL and use of any other wood has the appearance of violating some unwritten law.

Of the many different woods that have been used for gunstocks over the years, some of them acceptable, some excellent but so rare as to be impractical, and many that are just plain unacceptable for a variety of reasons. Fruit and nut trees, with a few exceptions, produce wood with characteristics suitable for gunstock use. The ideal color or figure may not always fill the desired requirements, but the general mechanical properties are acceptable. You must exercise care in the selection process to assure that a wood is chosen with sufficient hardness, proper shock resistance, and suitable color and figure. Be cautious about the use of butternut, gulf coast grown pecan, hickory, or persimmon and some of the fruit woods found in the south since the fast growth generally produces woods that are not of sufficient hardness to satisfy the minimal requirements. Stocks have been made of maple (hard, rock, sugar, and soft), apple, pear, myrtle, cherry, beech, rosewood, and many others.

Since World War II, with a ready source of good barrelled actions, the rise in popularity of the California rollover cheekpiece, and introduction of the thumbhole stock on sporting guns, suppliers of high-grade wood have been under great pressure to furnish suitable stockwoods to satisfy the custom buyer in both quality and quantity. These acts have introduced the shooter, via the custom gunsmith, to a whole new world of woods here-to-fore unheard of or forbidden by misinformation or Old Custom. This era saw the introduction of such native U.S. woods as madrone, myrtle, mesquite, and the rediscovery of maple and cherry. Cherry and maple had been popular stockwoods in the earlier days of the Kentucky flintlock, but has lost favor after the introduction of smokeless powder. Maple exhibits some magnificent

patterns in bird's-eye, quilted, and shell figure, but for some unknown psychological reason, dark colored wood has been most popular for gunstock purposes and the lighter colored woods have failed to attract their deserved attention. Maybe choices of future generations of gun buffs will make light wood the vogue.

Fifty-two walnut like woods are listed below. This list of candidate woods, mostly imported timbers, are provided for the reader to evaluate for potential future use as good walnut becomes more difficult to obtain and too expensive to use. The criteria used to develop the 'remarks' were relative to the American black walnut. (Hardness, 5% less for a value of 960 min.—weight, plus 20% for 46 pcf max.—shock resistance, 20% less for 8.6 min.—relative cost, equal or less than American black—valuable).

Wood	Wt.	Hd.	SR	Cost	Remarks
African blackwood	82			Average	Too heavy
African walnut	34	940	6.6		OK on low recoil
Angelique					Research
Angico	65				Too heavy
Apitong	47			Average	Evaluate
Australian Blackbean				Valuable	Evaluate
Blush walnut					Research
Boire				Average	Evaluate
Briar	40			Valuable	Good candidate
Cativo	30			Inexpensive	Evaluate
Caviuna				Average	Evaluate
Cocuswood	74				Too heavy
Coffeewood	74				Too heavy
Coique					Research
Crabwood	40	1200	13.4	Average	Good candidate
Dao				Average	Evaluate
East Indian laurel				Valuable	Evaluate
East Indian rosewood	53			Valuable	Too heavy
Friejo					Research
Greenhart				Valuable	Evaluate
Guanacste					Research
Gumbixava					Research
Imbuya	40	950	7.7	Average	OK on low recoil
Ipe	78			Average	Too heavy

Wood	Wt.	Hd.	SR	Cost	Remarks
Iroko				Average	Evaluate
Kokko				Valuable	Evaluate
Live oak	60		18.9	Average	Too heavy
Makore	40			Average	Evaluate
Mansonia				Average	Evaluate
Maracibo ebony					Research
Mora					Research
Mutenye					Research
New Guinera walnut				Valuable	Evaluate
New South Wales wal.					Evaluate
Omo					Research
Orientalwood	44			Average	Evaluate
Partidgewood	53				Too heavy
Pau Ferro	53			Valuable	Too heavy
Pau Marfim	60				Too heavy
Peruvian walnut					Research
Roble					Research
Rose walnut					Research
Shedua	50				Too heavy
Sucupira				Inexpensive	Evaluate
Tambootie	56				Too heavy
Tanoak	48	1400	17.9	Inexpensive	Too heavy
Tasmanian blackwood				Valuable	Evaluate
Wacapou	59	1730	17.0		Too heavy
Wenge				Valuable	Evaluate
Yellow walnut					Research
Yemri	28	550	7.6		Too soft
Ziricote	55				Too heavy

Some information and remarks are provided with the final task of evaluation left to the reader to complete as data on the wood of interest becomes more readily available. If sufficient data is not available, try to get the tests run for the needed data on the best potential candidates. A review of the list indicates that only a few candidates are suitable in the general walnut category. If price and availability of the wood permit, one might adapt many of the woods to a specific gun by recognizing that light recoil guns can use a wood with a lower value of SR than the 8.6 used and extra weight can be shaved off by proper stock construction techniques.

Beech, birch, and black cherry have been approved by the military as substitutes for walnut stocks on military weapons. Military requirements relate more to utility and have no room for consideration of beauty or character. These woods need to be dyed, but this is probably more desirable than finished-for-beauty stocks since dull shades fit in with the military color and camouflage scheme.

Germany was the first to make wide use of laminated stocks to fill a walnut shortage during WWII. These stocks were made of about 1/16" laminates of what appears to be a beech or birch, and were used on the Mauser 98 military rifle. Since the war several stock suppliers have catalogued laminated blanks, semi-inletted, and finished stocks of various woods and combinations of woods. Walnut/maple laminates were probably the most popular with buyers until the emergence of the camouflage fever in hunting gear when a resurgence of the laminated stock occurred. These are stocks made of dyed wood of various shadings to help the firearm blend in with the natural surroundings.

Any laminated stock will normally have better stability against warpage than even the best grade of solid wood blank. There are countless materials and color combinations from which to choose, but these, like most man-made materials, loose their beauty and character and just become flashy gun handles. You can construct a very useful and sturdy stock by laminating two 1¼", or three 13/16", boards of your wood choice using a good moisture resistant glue. This work can easily be done in a simple home workshop and produces a blank that can be turned into a utility stock that is stable and very economical.

Plastic and synthetic materials of various kinds have been tried from time to time for gunstock purposes. These trials were mostly unsuccessful due to inferior materials that would not withstand exposure to normal high temperatures and deteriorated rapidly beyond use. But with the development in the aerospace industry of the modern space age composite materials and the improvement in methods of fabricating fiberglass, these problems have been surmounted.

These materials, listed below along with raw material costs, are known in the aerospace trade as 'composites'.

Material	Weight	Approx. Avg. Cost
Kevlar-epoxy	86 pcf	$ 35/lb.
Graphite-epoxy	98 pcf	$ 50/lb.
Graphite-polyimide	98 pcf	$100/lb.
Carbon-carbon	102 pcf	$600/lb.
Boron-epoxy	124 pcf	$650/lb.
Glass-epoxy	125 pcf	$ 30/lb.

As can be seen from the costs shown above, the materials cost for a 2½ lb. stock will range from $88 to $1625, and this does not include the fabrication costs. Most of the synthetic stocks available today are largely glass-epoxy (fiberglass) or kelvar-epoxy, both of which are very heavy related to wood. Little or none of the expensive composite materials are utilized in these. In order to save weight and obtain the required stability and strength, a high percentage of the stock must be made of one or more of these composites so the trade off becomes one of more weight or greater cost. If a true lightweight stock is to be made of these composite materials, it will be very, very expensive. Ads in the current trade papers are around $200 for a high-tech stock that will probably require bedding, or final inletting, and finishing after purchase. Hopefully these costs will beocme lower as better fabrication techniques are developed and mass production of materials reduce that cost.

Special construction techniques have been developed to manufacture these stocks to save weight and secure stability. Most of the synthetic stocks are formed like the hull of a boat with fiberglass cloth layered in a mold and an epoxy type of adhesive used to permanently retain the shape and bond the material in position. At least one type of this stock is injection molded using about 600° F temperature and 20,000 pounds of pressure in the mold. Stocks correctly designed and properly constructed from these new materials are STABLE, lightweight, rugged, and almost unaffected by temperature or moisture changes.

But—these stocks are dead, dull, cold, and lifeless without character or beauty. By the time you have gone to the trouble to fit, bed, and finish a high-tech stock, this may be a greater investment (as shown earlier) in money and time than a high-grade walnut stock. But the lover of gorgeous woods can have the best of both worlds. By fitting a high-tech stock to your pet hunting rifle, you can use it in the field. During the off-season you replace the high-tech stock with the regular wood gunstock, having beauty and character, to store in the gun cabinet for display and admiration. This allows the advantage of accuracy and ruggedness for field use and beauty of the wood for display.

Many ingenious methods have been devised to utilize low-grade woods on high-grade guns. One example has been reported of one lot of high-grade Japanese guns where the figure and grain pattern were hand painted on the wood, by professional artists, before the final finish coats were applied.

Kleinguenther's of Seguin, Texas has experimented with impreg-

nating soft coarse woods with various materials to add strength and increase hardness to these woods. This makes these soft and weak woods adaptable and useable for gunstocks. With application of this technique and use of new and modern materials, when this development is reduced to an economic practice, many more woods could be adapted to gunstock use. This could be a boon to saving some of the high-grade stockwoods for wider use in the custom gunsmith trade.

Beauty is in the eyes of the beholder. If you have a dense piece of post oak with great figure and big enough to make your stock, there is no violation of rule or principle that prevents you from using it on your special gun project. Post oak is a satisfactory wood, though not very romantic, to make a sturdy and stable stock, and there may be a great many others just as suitable. For some unknown reason we have developed a taste for dark woods, but you see more and more of the maples, myrtles, and light colored woods being shaped into stocks, especially since the fairer sex has been taking a greater interest in the shooting sports.

CHAPTER X

HORTICULTURE AND THE FUTURE

What does the future hold? In general it is, at least, bleak. Gunstock wood trees, with some rare exceptions, are grown primarily for production of fruit or nuts. No known special program is established for producing exotic figured hardwoods. In France years ago the practice of planting a walnut tree when a baby girl was born, to serve as her dowry, has long since been discontinued. At one time the French would chain trees to produce a better grain color and figure. This practice no longer continues and most highly figured wood growth is left to nature.

In order to ensure a satisfactory future supply of gunstock wood for the cognoscenti of custom guns we need to mount a three pronged attack.

1. Organize and implement a plan to plant replacements for trees harvested for current uses.
2. Scientifically develop new tree species and hybrids that are propogated especially for production of gunstock woods instead of nuts or fruits.
3. Implement a long-term large-scale planting program to build a reserve of stock woods for future generations of custom gun builders.

First, we must somehow persuade the cutters harvesting trees for use today to plant at least two trees of a selected type in the general area of each tree cut. This would start a replacement supply of harvested wood and turn the slope of the long-term supply curve upward instead of allowing it to continue in the downward direction. All the popular gunstock woods should be planted (maple, myrtle, walnuts) and especially the various strains and varieties of the English walnut which will probably remain the most desirable gunstock wood for all foreseeable years to come. For those cutters unable, or not inclined, to plant replacement trees, one of the national organizations like the National Arbor Foundation, Fine Hardwoods/American Walnut Association, or some other organization should pick up the slack and make sure the replacements are planted.

All the cutters need to be convinced, for their own good and future

cutters, to save a few live cuttings for graft scions of each tree when, or before, it is cut. This will allow cloning of the tree if it should turn out to be an exceptional producer of high-grade blanks. It would be a shame to 'slab-out' a tree with out-of-this-world wood and no way of directly reproducing the result. If an exceptional tree is harvested, the scions can be grafted on a seedling walnut root of local origin and the cloned trees transplanted as close as possible to the point where the parent tree grew. Cutters, your grandchildren will thank you. Should you have questions about gathering or storage of the cuttings, information and help can be obtained from your local nurseryman.

Second, a large-scale scientific experimental program must be implemented with at least three major objectives.

1. Develop new strains and cultivars of walnut that are superior to the English walnut for gunstock use.
2. Determine how better figured, more color, and higher grades of woods can be grown and harvested.
3. Find ways to shorten the growth cycle of the trees and still retain the desirable characteristics of the wood such as hardness, checkering capability, machinability, and shock resistance.

If Bastogne was an accident of nature, imagine the potential results possible if a concentrated organized program using modern cloning and propagation techniques were applied to develop new types of trees with wood more beautiful, easier to work, and faster growing than English walnut. If the work would be focused on the WOOD instead of the edible nut production, new strains could be propagated that would rate 6★ grading time after time. This part of the program could not be considered complete until experiments with all the old types of trees are tied into the experiment. If Claro + English produced Bastogne and Claro + American Black gave the Royal (hybrid) walnuts in natural crosses, what about all the possible combinations of American Black/Arizona/Butternut/Claro/English/Japanese/Southern California/Texas/Tropical walnuts. Out of these combinations there ought to be at least one wood worthy of development into a worthwhile gunstock wood.

Along with development of new strains, varieties, and cultivars of trees, work needs to be done to determine methods to grow woods to obtain better figure, more color and higher grades of wood when harvested. Experiments should be performed on a variety of trees to determine what the effect is, and why, on the figure and grain pigmentation for abuse like 'chaining', injury, damage, and disease.

Experiments with induced deformity and other severe steps to change the growing conditions of the tree should be tried to see if consistent results can be obtained. We should determine if the wood color and watermark can be altered by use of minerals or chemicals added to the soil and to what extent this control can be exercised. What extent does the general environment of the growing area have on figure, grain, and color and what are the major controlling factors? How many of these can man control in an economical manner to produce better gunstock woods? Methods of treating wood after cutting should be analyzed to find ways to produce better wood (more beauty—easier working—stronger). A program of this magnitude and extent, in order to be productive, will of necessity be a multi-year undertaking (estimated at a minimum of 25 years) and can be done in a cost effective manner if several of the candidates for Master and Doctorate degrees in the universities and colleges of the Northwest are convinced to participate. All that is needed is to get one influential Professor of Forestry or Horticulture in one of the California, Oregon, or Washington universities aboard to get it organized and started. Once the program gets a full head of steam there will probably be a thousand new questions for each answer found, but that is what research is all about.

This author recently reviewed the Department of Agriculture's FY 1988 Small Business Innovation Research Program solicitation bulletin (SBIR-88-1). In it there are at least two suggested studies that could be satisfied by a walnut propagation or planting program that would be government funded. Funds of these study grants can be as much as $50,000 for the Phase I effort with up to $250,000 available for Phase II programs that demonstrate potential of developing a valuable end product. These grants are available to individuals as well as colleges, corporations, and non-profit entities. So the financial assistance is available if we will only develop a good program that will qualify for the contract grant.

As a step to assure an adequate supply of high-grade gunstock woods for future custom gunmakers and lovers of guns, a long-term large-scale planting program must be executed and continued as long as needed to supply the needs and the demand of the gun enthusiasts. One dependable way of accomplishing this part of the recovery plan would be to convince one, or more, of the national organizations like the Boy Scouts, Daughters of American Revolution, Future Farmers of America, one of the hardwood associations, or even an invididual or private group to work out a planting program with the land owners. Use of the new varieties and cultivars, developed in part 2 of the plan of known producers of good gunstock woods, for these plantings, will

give consistency and coherence to the overall approach. What the organization could do is work out an arrangement with the land owner to plant trees in out-of-the-way places on his property (in fence rows, corners, back lots, etc.) anywhere out of the way of farming or normal activities, with a split in the proceeds guaranteed by a written contract signed by both parties. It is true that neither party would gain much in their lifetime, except for the fruit or nut crops, but their heirs of future generations can be assured of handsome profits.

These trees will need to be identified with some kind of permanent tagging and be examined each year for health, growth, and general condition. Good records must be kept to obtain the maximum benefit from the statistical information needed to perfect the program. Two or three generations, at least 60 years, with proper care and planting could see a tremendous crop of valuable timber produced. This program should not be limited to the walnuts; other trees should also be planted such as sycamore, myrtle, and the maples even though the nut trees should take priority over all others.

Finally as a thought for the future, some folks invest in art, others in coins, real estate, and the like, but good guns in general have appreciated faster than any of these investments. High-grade guns have out performed the very best, outstripping inflation, coins, and art.

How many old Parker, Fox, LeFever, L.C. Smith, Winchester, and high-grade European guns are stored in attics, barns, closets, and gun racks throughout America that could, or should, be cleaned up, fixed up, and restored to like new factory condition. How nice it would be to have all of these American and European classics restored and upgraded to leave as a legacy for our children and the generations that follow. Many generations of hunting and shooting pleasure was built into these guns and they should be preserved in first class factory shooting condition for our future generations. Powders are available that are suitable for use in those with damascus barrels or these barrels can be sleeved with modern steels to allow the shooting of smokeless powder shells. Countless numbers of these old guns are masterpieces of the American gunmaker's art and are very valuable. Many of them will need new stocks, either for upgrade or to replace those with deteriorated or broken wood. Some would be greatly improved in value if authentic engraving styles were added to upgrade the gun to a higher grade. A large segment of our custom gunmakers specialize in restoration of these materpieces at reasonable prices and with workmanship worthy of the past masters.

APPENDIX A

ART AND PHOTOGRAPHY CREDITS

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Fig. 5	Page 6	Illustration by Tony Perez
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Fig. 7	Page 28	Illustration by Tony Perez
Fig. 8	Page 30	Stockwood from author's selection—Woodwork, engraving, and photos by Ed DeLorge
Fig. 9	Page 35	Wood and woodwork by author—Blank photo by Ed Shulin—Stock Photo by D. Postivit
Fig. 10	Page 41	Wood, woodwork, and stock photo by author—Blank photo by D. Postovit
Fig. 11	Page 45	Illustration by Tony Perez
Fig. 12	Page 48	Wood and gun photo by author—Blank photo by J. Watts—Stockwork by Ed DeLorge
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Fig. 14	Page 53	Wood, stockwork, and photography by Ed DeLorge
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APPENDIX B

LIST OF GUNSTOCK BLANK AND WOOD VENDORS

Listed below are some of the many gunstock blank and wood vendors throughout the U.S. and two overseas operations. This list was developed by use of trade paper advertisements, help from dealers, and word-of-mouth. It is not certified to be complete or totally accurate but should contain most of the important sources of gunstock blanks and exotic woods for trim and decoration.

Alamo Hardwoods, Inc.
P.O. Box 5398
San Antonio, TX 78201
(512) 736-3137
(Domestic and exotic blanks)

Don Allen
HC 55 Box 326
Sturgis, SD 57785
(605) 347-4686
(Walnut blanks)

Angelo and Little
N. 4026 Sargent
Spokane, WN 99212
(509) 926-0794
(Circassian and New Zealand walnut blanks)

Art Jewel Enterprises, LTD.
421 Irmen Dr.
Addison, IL 60101
(312) 628-6220
(Ebony, horn, ivory, mother of pearl, rosewood, and stag)

E.C. Bishop and Sons
P.O. Box 7
Warsaw, MO 65355
(816) 438-5121
(Blanks and carved stocks)

J. Earl Bridges
P.O. Box 504
Glenrock, WY 82637
(307) 436-8139
(Imported French walnut)

Jack Burres
10333 San Fernando Rd.
Pacoima, CA 91331
(818) 899-8000
(High-Grade Bastogne, Claro, and English walnut blanks)

Calico Hardwoods, Inc.
1648 Airport Blvd.
Windsor, CA 95492
(707) 546-4045
(Myrtle, Claro, and English blanks)

Don Cantwell
2503 Floral Ave.
Chico, CA 95926
(916) 895-3615
(Claro, English, and Bastogne walnut, olive and Pistachio blanks)

Albert Constantine & Son Inc.
2050 Eastchester Rd.
Bronx, NY 10461
(800) 223-2087
(Woods and veneer)

Roland Cox
1121 Buckhorn
Grants Pass, OR 97526
(503) 476-4095
(Walnut blanks)

Craftsman Wood Service Co.
1735 W. Cortland Ct.
Addison, IL 60101
(312) 629-3100
(Exotic woods)

Cloyce Davis
2475 Brubaker Rd.
Live Oak, CA 95953
(916) 695-2969
(Walnut blanks)

Denli Trading AG
Sihlquai 55
8005 Zurich,
Switzerland
01/42 51 02
(Turkish Circassian blanks)

Edward Dillon
KROS Walnut Products
6304 Rabbit Ears Cir.
Colorado Springs, CO 80919
(303) 598-4929
(Imported Circassian blanks)

Bill Dowtin
Rt 4 - Box 930A
Flagstaff, AZ 86001
(602) 779-1898
(French, Turkish, and Kashmir blanks)

Paul Dressel, Jr.
209 N. 92nd Ave.
Yakima, WN 98908
(509) 966-9233
(Oregon black walnut blanks)

D'Arcy Echols
P.O. Box 589
Ft. Collins, CO 80522
(303) 493-1298
(Blanks and carved stocks)

Bob Emmons
238 Robson Rd.
Grafton, OH 44044
(216) 458-5980
(Circassian blanks)

John Eyers
Rt 1 - Box 78
Cove, OR 97824
(503) 568-4589
(Claro, English and Oregon black blanks)

Reinhart Fajen Inc.
P.O. Box 338
Warsaw, MO 65355
(816) 438-5111
(Blanks and carved stocks)

Jerry Fisher
1244 4th Ave. W.
Kalispell, MT 59901
(406) 755-7093
(Blanks)

Flaig's Lodge
Millvale, PA 15209
(412) 821-1717
(Blanks)

Andy Garner
409 S. Palermo
Orville, CA 95968
(916) 534-6964
(English and Claro blanks)

Gould's Myrtlewood
1692 N. Dogwood
Coquille, OR 97423
(Myrtle blanks)

Roger M. Green
P.O. Box 984
Glenrock, WY 82637
(307) 436-9804
(Teyssier French walnut blanks)

The Gun Rack, Inc.
2919 Nolenville Rd.
Nashville, TN 37211
(615) 833-0136
(Blanks)

Carl Iacona
105 Kilvin Ave.
Stanten Is., NY 10306
(718) 979-7104
(California and imported French walnut blanks)

Johnson Wood Products
Rt 1
Strawberry Point, IA 52076
(American black walnut blanks)

May and Jimerson
9713 Hedger Rd.
Live Oak, CA 95953
(916) 695-1341
(Blanks)

Myrtlewood Factory
1785 Dowell Rd.
Grants Pass, OR 97526
(503) 479-9371
(Myrtle blanks)

Theodor Nagel and Co.
Postfach 28 02 66
D2 Hamberg, Germany
(Exotic woods)

Pachmayr Wood Products
409 S. Palermo
Orville, CA 95968
(916) 534-6964
(High-grade walnut blanks)

Paulsen Gunstocks
Rt 71 - Box 11
Chinook, MT 59523
(406) 357-3403
(Fancy and exotic woods)

Frank Paxton Co.
9229 Ward Parkway
Kansas City, MO 64114
(816) 361-7110
(Exotic woods)

Peterson Machine Carving
Box 1065
Sun Valley, CA 91352
(Blanks and carved stocks)

Skyler Phelps
13960 Via-Del-Sol
Auburn, CA 95603
(916) 269-2403
(Black and English walnut)

Preslik's Gunstocks
4245 Keith Ln.
Chico, CA 95926
(916) 343-0605
(Walnut blanks and other stock woods)

Wallace E. Reiswig
1235 Stanley Ave.
Chico, CA 95928
(916) 342-5188
(Claro blanks)

Richards Micro-Fit Stocks
P.O. Box 1066
Sun Valley, CA 91352
(213) 767-6097
(Blanks and carved stocks)

Riverside Lumber Co.
5451 Morrison Rd.
New Orleans, LA 70126
(504) 242-6624
(Exotic woods)

Roberts Gun Stocks
3420 Industrial Dr.
Yuba City, CA 95991
(916) 671-4570
(Blanks)

Don Rolund
Box 278
Powers, OR 97466
(503) 439-5025
(Maple and myrtle blanks)

Royal Arms Riflestocks
1210 R Bert Acosta St.
El Cajon, CA 92020
(619) 448-5466
(Blanks and carved stocks)

Sanders Custom Gun Service
2358 Tyler Ln.
Louisville, KY 40205
(Blanks)

Roy Schaefer
965 Hillard Ln.
Eugene, OR 97404
(503) 688-4833
(Blanks)

Shulin Stockworks
Rt 1 - Box 115
Trinidad, CO 81082
(303) 846-2301
(Stock blanks and carving)

St. John Wood Co.
650 St. John Ave.
Pasadena, CA 91105
(Exotic woods)

St. Joseph Wood Products
2801 Walnut Dr.
St. Joseph, MO 64503
(816) 232-6765
(American black blanks)

Surf N' Sea, Inc.
Box 268
Haleiwa, HI 96712
(Koa blanks)

Debra Talley
P.O. Box 821
Glenrock, WY 82637
(307) 436-8724
(Australian English blanks)

Jim Turner
125 West Tonea Way
Chico, CA 95926
(916) 343-6187
(English, Bastogne and
Claro woods)

Robert Watts
Rt 6 - Box 222A
Laurinberg, NC 28352
(919) 276-9028
(Okla. American black blanks)

Western Gunstock Mfg. Co.
550 Valencia School Rd.
Aptos, CA 95003
(408) 688-5884
(Blanks)

Willow Springs Walnut Products
Hwy. 60 & 63 West
Willow Springs, MO 65793
(417) 469-3128
(American black blanks)

W-M Sporting Gun Stocks
Box 429
Story, WY 82842
(307) 683-2506
(Blanks and carved stocks)

Woodruff Stockwoods
3027 Triway
Houston, TX 77043
(713) 462-7369
(Blanks and Carving)

World Of Wood, Inc.
6824 Veterans Blvd.
Metairie, LA 70003
(504) 456-9003
(Exotic woods)

Fred Wranic
6919 Santa Fe Ave.
Huntington Park, CA 90255
(English, American black
and mesquite blanks)

Wright's Sawmill
8540 S.E. Kane Rd.
Gresham, OR 97030
(503) 666-1705
(Bastogne, Claro, English, Oregon
black walnut and myrtle blanks)

APPENDIX C

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